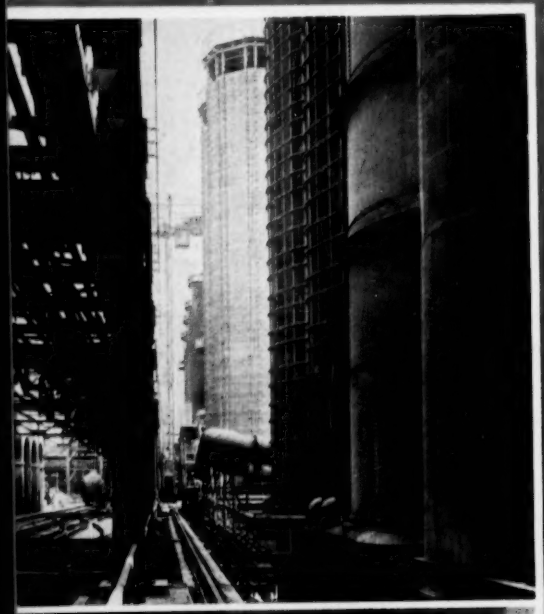
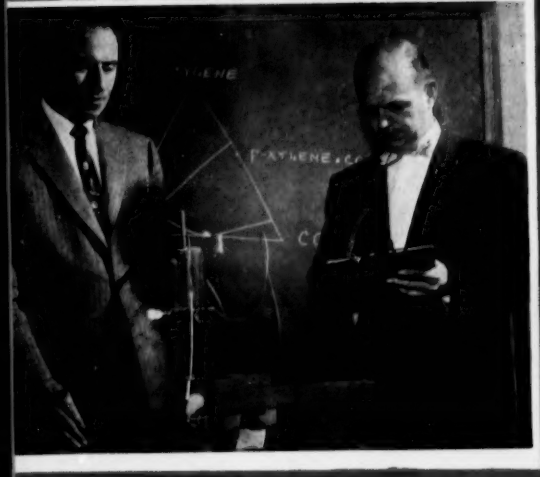
CW Report

Chemical Week

January 15, 1955 Price 35 cents





West German chemical output snaps back; exports vie vigorously for world markets . . . . . p. 45

It's dry vs wet, cardboard boxes vs glass bottles as bleach makers push new formulations . . . p. 56

Use solvents? Make antifreeze? Take a look at newcomer dimethyl sulfoxide . . . . . p. 62

Magnesium seeks peacetime outlets as defense needs dwindle—and it needn't seek far . . . p. 71

Cal Research's Egan and Luthy bet on new crystallization process to separate xylenes . . . p. 78

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Volume 76 — January 15, 1955 — Number 3

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ON January first of this year, Dorr-Oliver Incorporated became a corporate entity through the merger of The Dorr Company, Engineers and Oliver United Filters Incorporated. Not a merger in name only, the combined staffs, engineering skills and facilities of the two organizations are being welded into a single unit, with a vastly increased capacity to serve on a worldwide basis.

Both companies have their roots in gold ore metallurgy. The Dorr Company was founded by John Van Nostrand Dorr on his early inventions, the first of which was developed in 1904 to solve the problem of mechanical classification of gold ores. Oliver United had its beginning in 1907 with the development of the first successful continuous vacuum filter by Edwin Letts Oliver and its practical application to the cyanide process. Since their inception, both companies have grown steadily in technical stature to positions of leadership in their ever-widening and complementary, fields.

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OPINION . . .

Redwood Echo

TO THE EDITOR: . . . Although we can't give you any definite references to back up your statement about redwood paint difficulties (*CW, Jan. 1, p. 6*) we can say that many redwood homeowners tell us the same thing . . .

We have found that a catalyzed phenolic clear coating is the only thing that will stay on redwood and bring out and preserve its beautiful color . . .

A. J. LOCKREY
President
The Lockrey Co.
Southampton, N. Y.

No Bridge Buyers

TO THE EDITOR: It was a great pleasure to learn from your article "It Keeps Coming Back" (*Jan. 1, p. 66*)—[which reported on a paper presented before the AIChE by Aaron Teller of Fenn College]—that my process of utilizing by-product hydrochloric acid for the chlorination of hydrocarbons (U. S. Pat. 1,963,761, June, 1934) has almost been invented.

We hope very much that Mr. Teller will soon succeed in completing the invention by using hydrogen chloride as the sole chlorinating agent. After all, it is this process that we and other users of my Raschig phenol process use to produce upward of 100,000,000 lbs./year of monochlorobenzene and other chlorinated benzenes. If this process were not invented soon, where would we be?

In order to expedite this anxiously awaited development, I shall be glad to show Mr. Teller how we dropped the temperature somewhat lower than his 245-250, upped the yield somewhat above his 88-94%, improved the utilization of hydrogen chloride by a factor of 10 to about 99%, work with hydrochloric acid of less than 15% strength, produce the copper-alumina catalyst in 100,000 lb. lots, have no need for regeneration, extended the process to other hydrocarbons, and a few other things that I have found

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: W. A. Jordan, Chemical Week, 330 W. 42nd St., New York 36, N. Y.

quite desirable to know in commercially using this process for over 20 years.

I shall also be very glad to show the editors how to make a title search before buying the Brooklyn Bridge . . .

WALTER H. PRAHL
Vice-President, Research and Development
Durez Plastics and Chemicals, Inc.
North Tonawanda, N. Y.

We intend neither to option the Brooklyn Bridge, nor disparage the Prahl-Raschig process, nor extol the Teller research. But this is true: there have been many patents issued in the field (e.g., Prahl, Ernst & Wahl, Mares, Gorin, Fontana, De Benedictis, Cass, etc.). Says Professor Teller: "I have the highest regard for the accomplishments of Prahl; my work involves, essentially, the development of a catalyst that is produced by oxidizing an organic copper compound to form copper oxide on an alumina base. It is, consequently, highly dispersed and, we believe, may be regenerated. Its life appears to be longer than others we have tested and it gives high yields of chlorinated hydrocarbons."—ED.

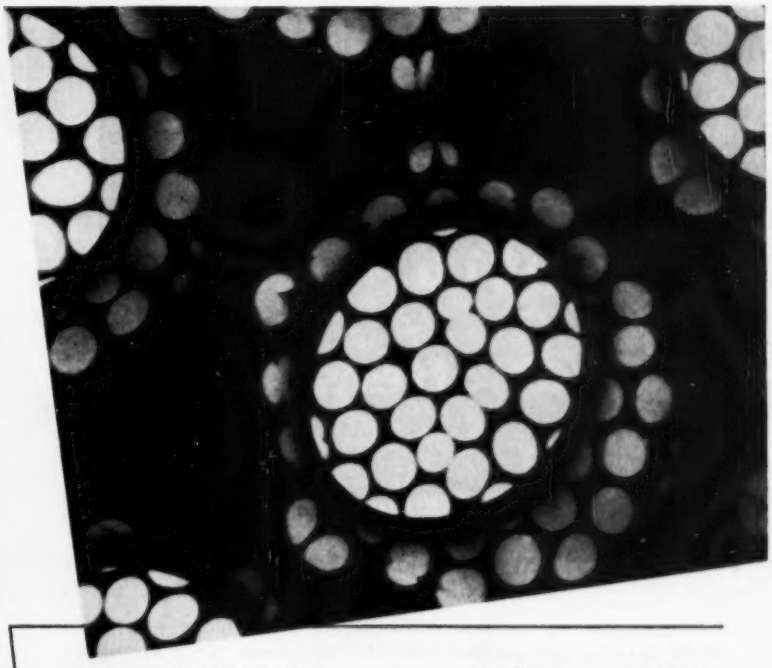
Mutual Understanding

TO THE EDITOR: The table of systemics (*CW, Dec. 25, p. 14*) would have been much more useful if someone had taken the trouble to check the chemical names. It would be preferable if *CW* used *Chemical Abstracts* nomenclature as a standard.

The name given for OMPA, "Bis (dimethylamino) phosphonous anhydride," is a British abortion given originally as "Bis-(bisdimethylaminophosphonous) anhydride." This monstrosity should be given a quick burial. The preferred CA name is "Octamethylpyrophosphoramide."

Demeton (Systox, etc.) and Meta-Systox are not phosphonates but thiophosphates (phosphorothioates in modern phosphorus nomenclature). Demeton is "O,O-Diethyl O-[2-(ethylthio) ethyl] phosphorothioate"; Meta-Systox is "O-[2-(ethylthio) ethyl] O-O-dimethyl phosphorothioate."

Dimefox is not an ester, as suggested by the name "Di(dimethylamino) fluorophosphate," but an acid fluoride. The correct name in the old phosphorus nomenclature would be "Tetramethyldiamidophosphoric fluo-



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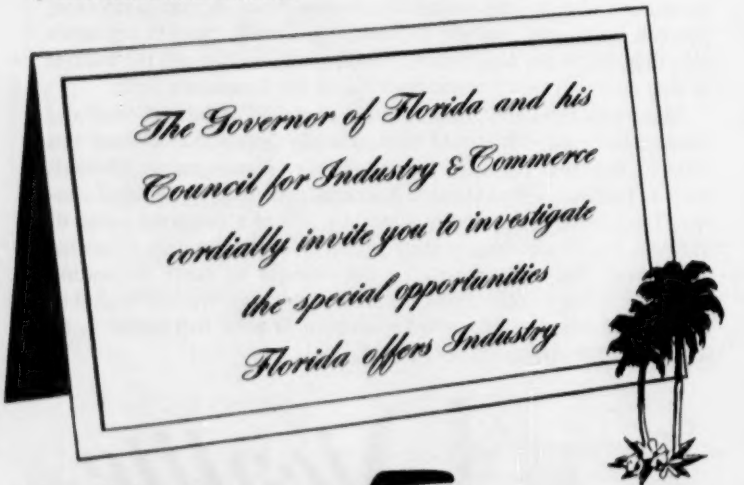
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OPINION . . . . . .

ride"; in current phosphorus nomenclature "Tetramethylphosphorodiamidic fluoride" . . .

H. L. MORRILL
Organic Chemicals Division
Monsanto Chemical Co.
St. Louis, Mo.

Good point. The table was checked, of course, and double-checked with government experts who now admit that they would prefer to synthesize test insecticides rather than name them. Moreover, Chemical Abstracts *changed its nomenclature system in 1952, so many references antedating that time are now "incorrect."*

The Kirk-Othmer encyclopedia also makes a pertinent observation: "It is a matter of regret that the nomenclature of this branch of chemistry has been allowed to fall into very considerable confusion. Owing to the several lines of thought used in the naming of organic phosphorus compounds in different localities, it has become almost necessary to append the chemical formulas to the names of compounds to be certain of mutual understanding."—ED.

DATES AHEAD . . .

Chemical Market Research Assn., joint meeting with CCDA, subject: chemicals in foods and feeds, Edgewater Beach hotel, Chicago, Jan. 20-21.

Plant Maintenance and Engineering Show, International Amphitheatre, Chicago, Jan. 24-27.

Chlorine Institute, annual meeting, Biltmore hotel, New York, Jan. 26.

Assn. of American Soap and Glycerine Producers, annual convention, Waldorf-Astoria hotel, New York, Jan. 26-28.

Chemical Institute of Canada, protective coatings division conference, Royal York hotel, Toronto, Feb. 24; Ritz Carlton hotel, Montreal, Feb. 25.

Drug, Chemical and Allied Trades section of the N.Y. Board of Trade, annual dinner, Waldorf-Astoria hotel, New York, March 3.

National Farm Chemurgic Council, annual chemurgic conference, Deshler-Hilton hotel, Columbus, O., March 22-24.

World Plastics Fair and Trade Exposition, National Guard Armory, Los Angeles, April 6-10.

American Drug Manufacturers Assn., annual meeting, Boca Raton Club, Boca Raton, Fla., April 13-14.

Conference on Biological Waste Treatment, Manhattan College, New York, April 13-15.

American Pharmaceutical Assn., annual convention, Miami Beach, Fla., May 1-6.

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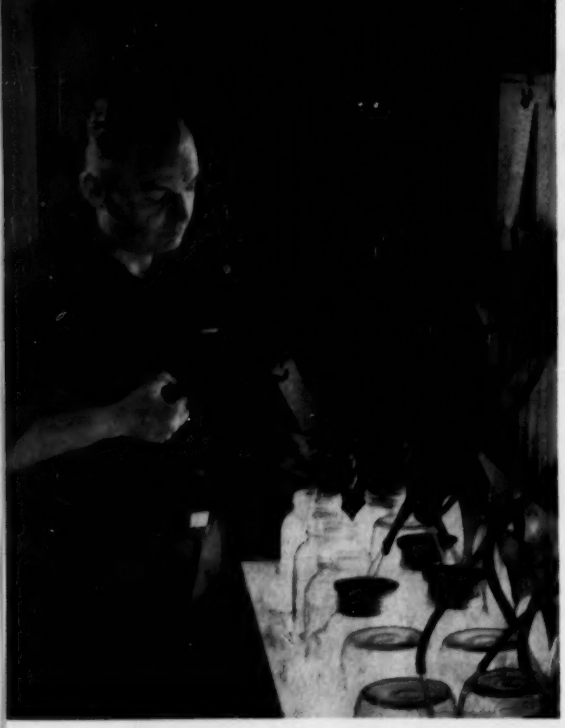

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NEWSLETTER

If you've furrowed your brow while looking toward Europe, worrying about intensified competition for world chemical markets from West Germany *(see p. 45)* and other nations, don't neglect what's happening over your shoulder—in Japan.

Although Japanese chemical exports to Latin America are small, the upward trend is significant. In all 12 months of 1953, Japan sent $689,000 worth of chemicals to Argentina, $549,000 to Brazil; but in the first 9 months of 1954, exports to Argentina totaled $1.7 million and to Brazil, $2.8 million.

If a direct extrapolation to a full 12 months is valid, the export jump is 229% and 571% to the two countries, respectively.

•

Japanese traders are apparently more knowledgeable than Russian specialty formulators. The Soviet regime has plans, according to *Izvestia,* to increase the quality and variety of household chemicals.

Acknowledging that complaints are justified against products now on the store shelves, the U.S.S.R. Ministry of the Chemical Industry has ordered improvement of soaps, detergents, glues, insecticides and plant growth stimulators. Also, inhibited hydrochloric acid will replace the corrosive technical product now sold as a stain remover. A campaign is also being waged to remove from the market all household soaps that "lather poorly, emit an unpleasant odor, and leave spots on the clothes."

•

A fourth group this week confirmed the decline in chemical capital outlay. Reflecting the findings of McGraw-Hill, Manufacturing Chemists' Assn., and Dept. of Commerce-Securities & Exchange Commission, the Business & Defense Services Administration noted that 1954 expenditures were 21% below 1953's $1559 million, and that this year's anticipated first-quarter outlay, $263 million, is 22% lower than in last year's comparable period.

But despite the fact that the defense buildup is almost complete, 1955 will be—gauging by the first quarter—the fifth year in a row that new plants and equipment have topped the $1-billion mark.

•

The future of Texas City's tin smelter will be decided this spring. Senate staff investigators are studying whether operation should continue beyond June 30, the deadline now on the books. They will report next month to Sen. Fulbright (Banking Committee) and Sen. Russell (Armed Services Committee), whose committees are required to make a joint recommendation by March 15.

State Dept. officials are eager for a quick decision, since the Indonesian tin purchase contract expires in March, the Bolivian agreement in April.

Fulbright last year favored continued operation of the smelter, as did Texas' Sen. Lyndon Johnson, now majority leader. It seems likely, then, that despite the Administration's recommendations to the contrary, the smelter will continue to operate. Eisenhower probably won't make an issue of it.

Arizona seems like an unlikely spot for an ammonia plant, but two firms are considering projects there:

• Southwest Agrochemical Corp. has optioned a site at Phoenix for a 25-ton/day plant to cost about $1.25 million. It's a new company headed by Ervin Harvey, former Fluor Corp. engineer.

• Thunderbird Corp. is scouting Arizona sites for a combination refinery and ammonia plant to cost about $16 million.

Freight's the factor that makes an Arizona plant attractive. Ammonia must now be hauled several hundred miles to meet local needs.

•

There's a new name in uranium—Vitro Minerals Corp. The new corporation is a joint subsidiary of Vitro Corp. of America and Rochester & Pittsburgh Coal Co., set up to exploit uranium claims held by the two parent companies in Wyoming, Utah and Ontario.

Uranium mining, production and construction is now a $100-million/year industry, says the Atomic Energy Commission, with 430 operators and 530 mines.

And it's a field rife with rumors, speculation—even hoaxes. W. R. Grace & Co. is trying, with the help of the FBI, to track down the source of phony telegrams sent to newspapers, columnists, and financial services, saying that Grace would soon announce its discovery in Peru of the most extensive uranium deposits in the Western Hemisphere. Some of the wires were unsigned; others were signed "Peruvian Consulate." Likeliest culprit: someone trying to cash in on a stock price rise.

•

Another new joint subsidiary is Standard Chemicals Ltd., set up by Columbia-Southern Chemical (majority owner) and Dominion Tar & Chemical to take over the latter's caustic-chlorine plant at Beauharnois, Que., and chemical resale operations.

•

Straw in the wind? The U. S. Tariff Commission turned down an application by domestic manufacturers for higher duties on inedible gelatin and animal glue.

Seeking relief under the "escape clause," the National Assn. of Glue Manufacturers contended that the domestic industry has been hurt by imports.

The Tariff Commission argued in rebuttal that the profit margin during 1953 and the first half of 1954 was 10.2-10.3%, whereas the 1947-49 margin—before tariff concessions—ranged from 7.5 to 13%.

•

In Texas—British accents, a new raw material, and a court reversal in favor of Shell Chemical:

• The British accents will be heard next week in Orange, where an eight-man Imperial Chemical Industries team will arrive to assist in the start-up of Spencer Chemical's 45-million-lb./year polyethylene plant, scheduled to go on stream within 90 days.

• The raw material is alum (aluminum sulfate liquor), to be made for the first time in the Houston area by Consolidated Chemical Industries for local water treatment and paper customers.

• The reversal—by the Texas Supreme Court of itself—forbids Deer Park to annex a 440-acre tract owned by Shell Oil and Shell Chemical. Depriving Shell's property of police protection and other municipal services, it also deprives Deer Park of Shell's potential tax payments.

. . . The Editors

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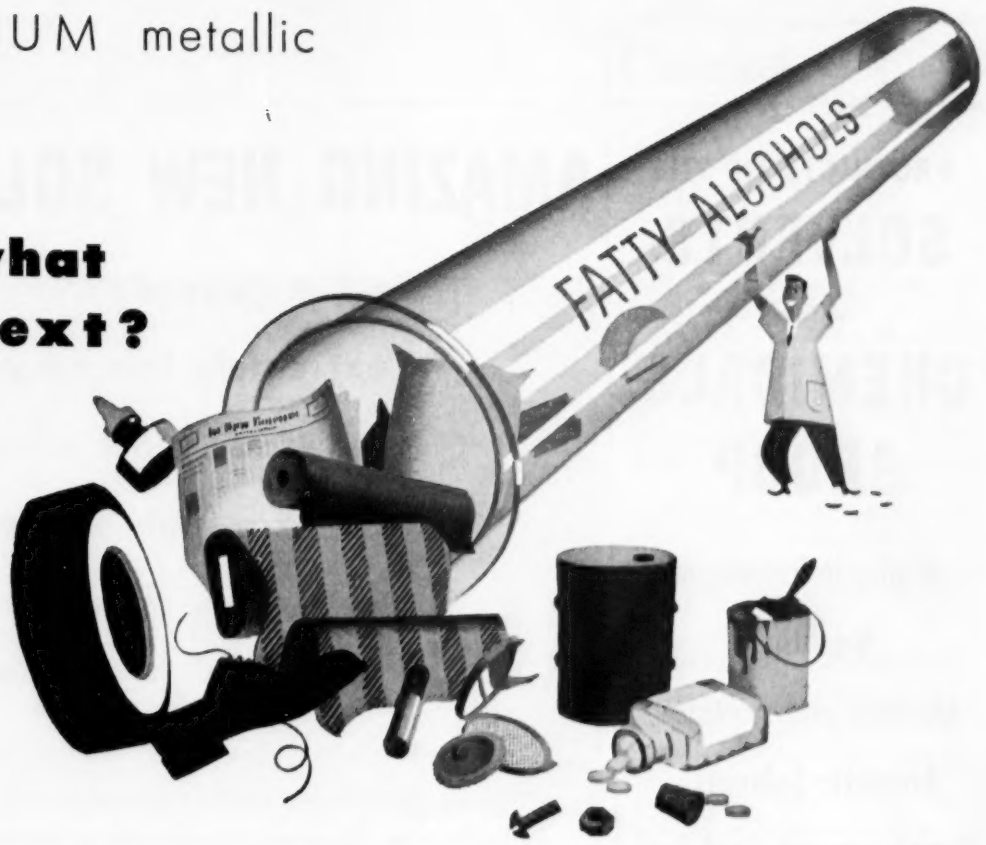

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Fully the equal of carbon tetrachloride in cleaning power and drying time yet no more toxic than the petroleum naphthas.* No flash point—No fire point—and relatively safe for cold cleaning of the common metals including aluminum.

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BUSINESS & INDUSTRY. . . .

WIDE WORLD

EISENHOWER: Advocates a fistful of new legislative measures . . .

Some Polemical, Some Not

The Administration's position on chemical legislation is now on the record, following President Eisenhower's report to Congress on the state of the Union.

On the basis of his message, here's what management should expect that the Administration will put before Congress this year:

• Renewal of the 52% tax on corporation income, now slated to drop to 47% April 1. But the White House will continue to stand behind the proposal to drop the rate on income earned abroad to 38%.

• Gradual reduction of "certain tariff obstacles" to trade, on the part of the U.S. (*see p. 16*).

• Further simplification of Customs administration and procedures.

• Extension of the Defense Production Act, which authorizes priorities, allocations, and similar material controls. Whether or not this act is renewed, the government will still have the option to grant fast tax write-offs.

But preference will be given to write-offs for specialized research and development facilities.

• Better consumer protection under the existing Food, Drug & Cosmetic law. This will involve a larger inspection program for Food & Drug Administration personnel.

• A strengthened program to combat the "increasingly serious" pollution of U.S. rivers and streams, through a toughening of measures now on the books—notably the 1948 Water Pollution Control Act.

On air pollution, the Administration will offer proposals not only to increase federal research, but also to give tax advantages for installation of abatement equipment.

Two other Eisenhower proposals will primarily affect smaller chemical concerns.

• An increase of the federally set minimum wage from 75¢ to 90¢. The main objective: to push the whole wage structure upwards.

• Extension of the 1953 Small Business Act, which set up the Small Business Administration, and its network of management specialists, procurement-aid offices, etc.

On the face of it, this could be an imposing list of measures if adopted in toto. But a number of the proposals are sure to run into heavy water almost immediately. Some government officials as well as leading industrialists have already taken a position in direct opposition to the President's views. Result: chemical legislation is due for a mighty tussle—one that could drag long into the summer months.

Northeast Expansion

Northern Chemical Industries' plans for building a 125-ton/day ammonia plant at Searsport, Me., received a firm send-off last week when financing arrangements were finalized. Bond purchase agreements (for $9 million) have been signed with New England Life Insurance Co., First National Bank of Boston and Guaranty Trust Co. of New York, pursuant to which the company will issue $3.5 million of first mortgage notes.

White, Weld & Co. underwrote $5 million of 5½% subordinated debentures and 100,000 shares of common stock offered publicly in the form of units (each consisting of $1000 par value of debentures and 20 shares of common stock).

Preliminary grading operations at the plant site have started; engineering and construction contracts have been awarded to Girdler Co.

Northern Chemical currently manufactures agricultural and industrial chemicals at Searsport. Original facilities, built in 1944, turned out sulfuric acid and superphosphates, were expanded in 1948 to produce sodium silicofluoride, in 1950 to produce ammonium sulfate, and in 1953 to manufacture liquid aluminum sulfate.

With the completion of ammonia facilities James E. Totman, Northern Chemical's president, hopes to extend company activities both in the New England mixed fertilizer business and in industrial channels—especially with paper and pulp firms.

LYN CRAWFORD-McGRAW-HILL

Fight over Federal Role

WHATEVER ELSE they accomplish, current hearings by the Federal Trade Commission on controversial battery additive AD-X2 may some day be studied by Congress in writing a new law on what the federal government should or should not do in connection with marketing of commercial products. These pictures show the principals* in New York as they debated the Jeffries committee report (*CW, July 4 and Nov. 28, '53*), which gave a stamp of approval to the AD-X2 testing that had been done by the National Bureau of Standards. The FTC hearing examiner ruled last week that the Jeffries report would not be used as evidence in these hearings, which will continue in 11 cities from Boston to Chicago and Knoxville during the next three weeks. AD-X2 maker Jess Ritchie claimed a tactical victory in the ruling against the report and in Jeffries' admission that there were no "battery experts" on the Jeffries committee. FTC's charge: that AD-X2 falls short of ad claims.

* Above, Hearing Examiner William Pack, Chairman Zay Jeffries of the special committee from the National Academy of Sciences; and stenotypist Jerry Pellis; below, FTC lawyer R. P. Bellinger, AD-X2 attorney Kahl Spriggs, and Mr. and Mrs. Ritchie.

Strict New Job Clause

If you sell directly to the federal government or any of its agencies, watch for a new and more sweeping nondiscrimination clause to show up in your next U.S. purchasing order.

Without any drum-beating, the Eisenhower Administration has adopted new wording aimed against unfair employment practices—and the word is out that the Administration means business. It won't wait for complaints, but will follow through on its own initiative to see that the terms are met.

This is the Administration's own substitute for the all-encompassing federal Fair Employment Practices Act that has long been advocated by some Northern Democrats. It will apply to any plant producing soap, paint, rocket fuel or anything else under a governmental contract.

Nondiscrimination clauses aren't new in government purchase contracts. But the old standard phrasing apparently couldn't be enforced. The new clause—recommended by a special committee headed by Vice-President Richard Nixon—forbids racial or religious discrimination in employment, upgrading, demotion, transfer, recruitment, layoff, wages and selection for training programs. Violation of this clause would mean loss of a firm's sales to the government. In extreme cases, the government could bring criminal suit as a last resort.

Atomic Pacesetter

Setting off the New Year in what most observers concede is the pattern of things to come, the Office of Defense Mobilization last week issued a certificate of necessity for the first atomic power plant to be built by private industry. Receiving the tax write-off was Duquesne Light Co. (Pittsburgh) for its share of the cost of a power plant being built at Shippingport, Pa., together with Westinghouse Electric Co. and the Atomic Energy Commission.

Duquesne's share—the generating plant—will cost over $14 million; Westinghouse is building the nuclear reactor under contract with AEC. Total cost: over $45 million.

Good bet: the Duquesne write-off will set off a rush of new applications to ODM for fast tax write-off grants.

WIDE WORLD

COOPER: Previewed the President's position on foreign trade.

Just as Predicted

President Eisenhower this week officially unwrapped his foreign trade liberalization program in a special message to Congress. But there were few surprise packages included for chemical management in the 2400-word message—first in a series of special addresses on specific phases of his foreign aid policy.

Just as anticipated by H.R. 1, introduced by House Ways and Means Committee Chairman Jere Cooper (D., Tenn.), Eisenhower asked for a three-year renewal of the Reciprocal Trade Act with an extra 15% tariff-cutting authority.

Democrats were virtually pledged to support his plea; major opposition was expected to come from the protectionist wind of the GOP, which succeeded last year in sidetracking a similar Eisenhower request.

Also requested was further simplification of customs regulations. (Specifically, Eisenhower asked for passage of the Jenkins bill, which would change the yardstick for evaluating imports for duty assessment from "foreign value" to "export value.")

Too, Congress was asked to approve U.S. membership in the General Agreement on Tariffs and Trade (GATT), to cut taxes on income from foreign investments 14 percentage points, and to approve U.S. participation in the proposed $100-million International Finance Corp. (designed to spur private international capital investment). No changes were requested in the "Buy American Act," which gives domestic bidders on government contracts preference over foreign bidders. Originally the Administration planned to ask for repeal of the act but it was decided to liberalize its application by Executive order instead.

Opening Salvo: The President's message is the official opening gun in the usual Congressional battle waged over tariff and trade policy. But this year the struggle will take on a new look.

Protectionists in Congress have virtually conceded defeat on the main issue—three-year renewal of the Trade Agreements Act, admitting that the combination of a Democratic Congress and a freer-trading Republican President is too tough to beat. Instead they'll make their stand on the constitutional issues involved in the trade liberalization program.

A major attempt will be made to limit the President's powers under the Reciprocal Trade Act strictly to negotiating tariff agreements.

Protectionists will also concentrate fire on GATT, which will be submitted for Congressional approval in the spring.

Main argument: that both these measures involve a further delegation of Congress' constitutional tariff-setting powers to the Executive branch and to an international organization —and hence are unconstitutional.

Limitation of the President's powers under the Trade Act and Congressional failure to approve GATT could stall the whole reciprocal trade program, free-traders admit. The Administration has gone far out on a limb in saying now that it won't use any new tariff-cutting authority granted by Congress except within the framework of GATT's multilateral tariff-cutting machinery. Reason for its stand is an attempt to force U.S. trading partners now renegotiating GATT in Geneva to agree to a treaty that Congress will accept. But the decision could easily backfire and tie the President's hands in negotiating new trade agreements if GATT is blocked by Congress.

That means that the White House is liable to fight hard for its initial requests, won't be easily persuaded to agree to compromise measures.

Productivity Parley

While delegates to the ninth meeting of the General Agreement on Trade and Tariffs are still in session at Geneva, Switzerland, another meeting of international import to chemical industry will be held in that same city next month.

Twenty-one nations, including the U.S. and Canada, are scheduled to send delegates to the fourth session of the Chemical Industries Committee of the International Labor Organization —which is a specialized agency of the United Nations. The two-week meeting starts Feb. 7.

Productivity is No. 1 topic on the agenda. Delegates will discuss an ILO report that goes into methods by which management and workers in chemical plants can increase output averages, and incentive payment systems. A second agenda item will be safety and hygiene in chemical plants, and use of standard labeling symbols to identify dangerous materials (*CW, Dec. 20, '52, p. 62*). Also to be taken up: a general ILO report on recent developments in the chemical industries, outlook for the future, and steps to put into effect the recommendations of the committee's 1952 session.

Expected to serve as U.S. delegates: from industry, Monsanto personnel director E. W. Dwyer and Secretary Maurice Crass of the Manufacturing Chemists' Assn.; from labor, Secretary-Treasurer Cecil Martin of the United Gas, Coke & Chemical Workers (CIO) and Vice-President John Lewis of the International Chemical Workers Union (AFL); and from government, H. B. McCoy of the Commerce Dept.'s Business & Defense Services Administration and a yet-to-be-designated representative of the Labor Dept.

Not Totally Harmless

The handwriting on the wall this week was almost final and official.

The long expected order removing three coal-tar colors from the Food & Drug Administration's "approved for use in foods" list has been published in the Federal Register. Though interested parties who appeared at hearings last January may file exceptions up to Jan. 28, there's little chance the order will be modified.

It's been no secret that FDA planned to take FD&C orange No. 1,

orange No. 2 and red No. 32 off the "foods" list and allow them to be used only in noninternal drugs and cosmetics (*CW, Aug. 21, '54, p. 28*). But the switch may hit hard some Florida citrus growers.

While oranges from Florida's Indian River area have naturally orange-colored skins, the skins from most other areas in the state tend to be paler; so growers have been using the oil-soluble FD&C red No. 32 to make their fruit more attractive to consumers. Now this use will be banned, even though the amount of color used on each orange was exceedingly small.

Under present laws, food colors must be harmless in any amount; and intensive tests have shown that these colors are toxic when consumed in certain quantities. It's believed that FDA would like to have the law changed to give the agency more discretion over listing of food colors.

EXPANSION. . . .

Resins: Key Chemicals Corp. has started shipments from its new plant in Medley, Fla. Included: alkyds, specialty textile resins, polyester resins, emulsion polymers, vinyl plasticizers, and emulsifying agents. Main effort will be made to sell in the Southeast, but Key also hopes to export to tropical and subtropical countries in the near future.

•

Copper: Four U.S. mining firms, headed by American Smelting & Refining Co., plan joint development of three Peruvian copper properties with reserves of over a billion tons of copper-bearing ore. Other partners in the deal: Cerro de Pasco Corp., Newmont Mining Corp., and Phelps Dodge Corp.

Under present arrangements, Peruvian copper property owned by all four firms will be transferred to a new corporation—the Southern Peru Copper Corp.—which has already been granted an Export-Import Bank credit of $100 million. Actual production, company officials say, should start within five years.

COMPANIES. . . .

Allied Chemical & Dye Corp.'s Barrett Division has bought a plant in Sunbury, Pa., formerly leased by Westinghouse Electric Corp. Purchase price has not yet been revealed.

•

Stockholders of Standard Silica Co. have approved sale of their company's fixed assets to Ottawa Silica Co. (Ottawa, Ill.) for $850,000. The firms owned adjoining sites west of Ottawa.

•

The Organic Chemical Division, Monsanto Chemical Co. (St. Louis) has received a fast tax write-off certificate for $155,000 at 55% covering chemical research and development facilities.

•

A number of chemical companies have been incorporated in Dover, Del., recently:

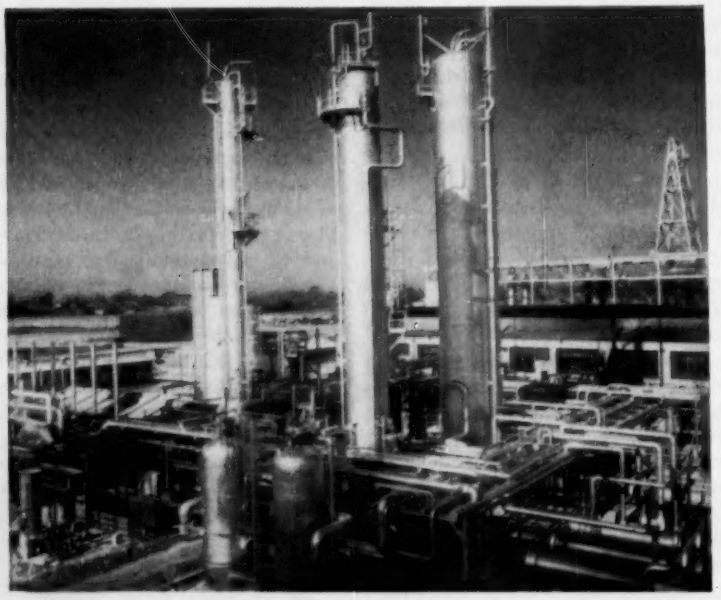
- American Eagle Uranium, Inc.: authorized capital stock, $50,000.
- Colohama Uranium, Inc.: authorized capital stock, $100,000.
- Abaca Chemical Corp.: authorized capital stock, $510,000.
- Pence Alkaloid-Chemical Corp.: authorized capital stock, $10,000.
- Hamilton Plastics, Inc.: authorized capital stock, $100,000 and 4000 shares of stock, no par value.

•

Climax Molybdenum Co. has acquired oil leases in northeastern Oklahoma, valued at more than $5 million, from the Whitehall Oil Corp. of Tulsa. The properties will henceforth be operated as the Climax-Brundred Waterflood Division of the parent company.

•

Abitibi Power and Paper Co., Ltd., which recently sold 40,000 shares of its common stock in Alaska Pine and Cellulose, Ltd. to Rayonier, Inc., received $9.8 million for the sale, after adjustment for exchange rates. Abitibi still owns 10,000 shares of Alaska Pine stock; the two companies have an arrangement whereby, at any time up to Dec. 31, 1957, Rayonier may purchase all or part of Abitibi's remaining shares, and Abitibi may demand the purchase by that date.



Making Its Formal Bow

GRACE CHEMICAL CO.'S $20-million ammonia-urea plant in Memphis, Tenn., had its grand unveiling last week. According to Wm. Gage, president, the new plant will shortly reach its rated capacity of 250 tons of ammonia daily, should be producing 150 tons/day of urea by February. Most of the ammonia, company executives say, will be marketed in the mid-South; urea, nationally.

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SOLVENTS AND SOLVENT OILS

COAL TAR AROMATICS

Picco Coal Tar Aromatics are used extensively in the Paint and Varnish industry where good solvency and controlled evaporation rate are required. They are especially useful for alkyds and other synthetic resins. Large volumes are used in automotive finishes and in various industrial paint applications. These Coal Tar Aromatics also find use in solvents for rubber and rubber cements, dyes, and degreasing applications.

COAL TAR HEAVY NAPHTHAS

These are semi-refined, selected coal tar fractions having excellent solvency for applications ranging from wire enamels to roof coating compounds. Pitches, tars, and asphalts can be cutback with these Coal Tar Heavy Naphthas. Other uses include printing inks and sludge solvents.

SOLVENT OILS

The Picco Solvent Oils include Shingle Stain Oils, neutral extenders for creosote, holder oils for the gas industry, and thinners for bituminous paints. Their moderate solvency and high flash point permit their use in numerous other applications.

HEAVY OILS

The characteristics of the Picco Heavy Oils make them ideal for weed killing oils, sludge solvents, and tar cutbacks. They are also useful in the manufacture of insecticides and disinfectants. Dipolymer Oil is an excellent processing agent in the rubber reclaiming and synthetic rubber industries.

AROMATIC PETROLEUM NAPHTHAS

This complete series of petroleum fractions enables many manufacturers to select suitable substitutes for the common coal tar solvents at a substantial savings. Applications include paints, varnishes, lacquers, printing inks, rubber compounds, and insecticides.

HISOLV HEAVY NAPHTHA

The Hisolv Heavy Naphthas contain methyl naphthelenes and have good solvency for insecticides such as DDT, 2,4-D esters, and chlorinated camphene. They are also very useful as vehicles for wood preservatives. Their high flash points and low cost are also attractive features.

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Plants at Clairton, Pa.; West Elizabeth, Pa.; and Chester, Penna. *District Sales Offices:* New York—Chicago—Philadelphia—Pittsburgh—Detroit

Pennsylvania Industrial Chemical Corp. (CW)
Clairton, Pennsylvania

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- ☐ Coal Tar Aromatics
- ☐ Coal Tar Heavy Naphthas
- ☐ Solvent Oils
- ☐ Heavy Oils
- ☐ Aromatic Petroleum Naphthas
- ☐ Hisolv Heavy Naphtha

Name_____ Position_____

Company_____

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FOTO BRANDTS, HAMBURG

GERMANY'S GEFELLER: With 451,650 members, his chemical union is world's largest.

JOH. DE HAAS, AMSTERDAM

NETHERLANDS' TILBURG, VINK, HERIK: Among Dutch chemical workers, close cooperation ended by edict that Catholic union withdraw from Socialist labor council.

Abroad, No Bed of Roses

Labor costs are much lower for foreign chemical companies than for U.S. producers; but for all that, few chemical concerns abroad would admit that their labor relations are—by any standard—a bed of roses.

In sizing up foreign competition, chemical firms in the U.S. and Canada now take into consideration the fact that nearly all labor unions in other industrially developed nations are notably more Marxist in outlook and in action than the chemical unions on the domestic scene. A CHEMICAL WEEK survey this week shows that in countries accounting for nearly all chemical production outside of North America and the Communist nations, membership in chemical labor unions breaks down like this:

In Communist-led unions	11.4%
In Socialist-theory unions	79.6%
In right-wing Socialist unions	8.9%

On top of this, it must be remembered that in most of those countries, the chemical labor unions are more influential than their American counterparts because their membership covers a larger proportion of the hourly paid chemical workers in their respective countries.

Nearly Unanimous: In West Germany, for example, the union led by 48-year-old former machinist Wilhelm Gefeller claims a membership of vir-

MARCELLO SALUSTRI, ROME

ITALY'S LAMA, REGGIO: In latest clash, a slap for Lama's left-wing chemical union.

A. PFISTER, ZURICH

AUSTRIA'S SCHWAB, SWEDEN'S JOHANSSON, SWITZERLAND'S KOLB: On economic front, their unions oppose Communism, favor limited nationalization.

THE TIMES OF INDIA

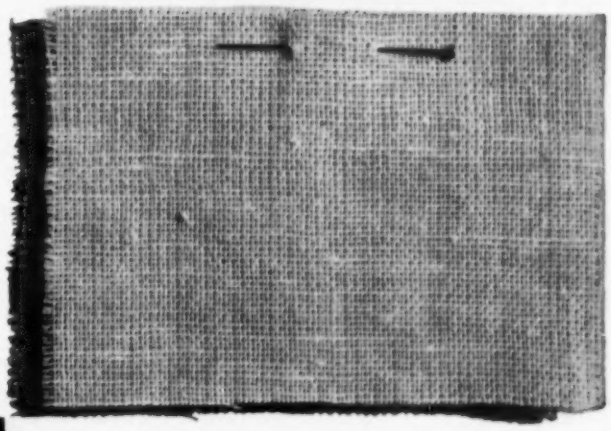
BARRATTS, LONDON

FRANCE'S COSTE, BELGIUM'S PLUMIER, INDIA'S JOSHI, BRITAIN'S EDWARDS: A rebel against Red domination, a chemical worker since youth, a "neutralist" and a British union newcomer—all anti-Communists, but not "pro-Western."

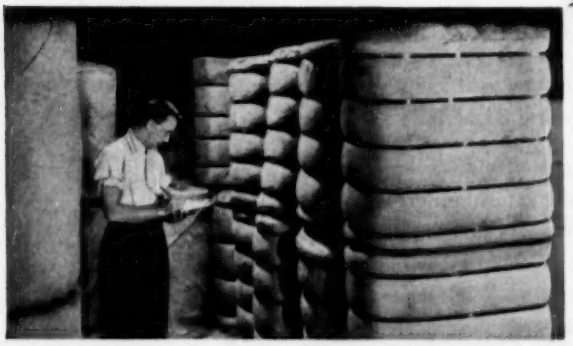
Dowicide Preservatives

protect grey goods and finished textiles against mildew

Liquid starch size containing Dowicide Preservative guards cloth fibers from discoloration and structure-weakening mold growth



Bolts of grey goods and finished textiles can be stored far longer without suffering costly damage from mold destruction.



DOWICIDE® PRESERVATIVES make the difference so obvious here. These two grey goods samples are identical in all but *one* respect: sample at *top*, above, is sized with *unpreserved* starch; piece *below* is warp-sized with liquid starch containing a Dowicide Preservative. Samples were exposed for equal time to conditions favoring mold growth. Piece with *untreated* size is discolored and weakened—costlier, heavy bleaching is now necessary to remove discoloration. In contrast, sample with *preserved* size has effectively resisted mildew.

In almost *any* business you might name, Dowicide Preservatives of widely varying characteristics increase manufacturing efficiency and hold top product quality. Fourteen different Dowicides are used in the leather, paint, petroleum, paper and pulp, adhesives, agricultural, transportation, cordage and other industries. *Your* processing, packaging or selling operations might well benefit through use of one or several of these versatile Dowicide Preservatives.

Dow's laboratories will consult with you regarding your individual preservative problems. For detailed information, mail coupon to THE DOW CHEMICAL COMPANY, Midland, Michigan.

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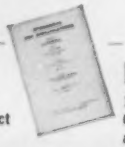

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Story begins on p. 18

tually 100% of all eligible employees in chemical, paper and ceramic factories (*see table*).

Here's what Socialist unions can mean to management: as much pressure for wage increases as comes from U.S. unions, and even more push for added fringe benefits; steady demands for increased governmental regulation of industry and sometimes even for nationalization; political campaigning for heavy taxes on corporations and low taxes on wage earners; and in some cases, bids for varying degrees of "co-determination."

With a Communist union in the plant, a foreign company faces all those jabs plus occasional use of strikes for political purposes, possible sabotage and slowdowns to cut output or punish the employer, and even espionage of trade secrets.

All this doesn't mean that foreign chemical competition is a myth; but it's a reminder that foreign producers have at least one vulnerable spot in international rivalry: their production depends on the whims of unionists who'd be happier if the private firms failed and were nationalized.

SOME RED, SOME NOT: CHEMICAL LABOR UNIONS ABROAD

Country	Communist-dominated or oriented	Socialist	Right-wing Socialist or "New Deal-ish"
West Germany		Chemical, Paper & Ceramic Industries Union	
United Kingdom		Chemical divisions of British trades unions	
France	Chemical branch of General Confederation of Labor	Chemical branch of Workers Force	Chemical branch of French Confederation of Christian Laborers
Italy	Italian Federation of Chemical Workers	UIL Chimici	Federchimici
Austria		Austrian Union of Workers in the Chemical Industry	
Japan	Great Chemical Industry Labor Union	Federation of Synthetic Chemical Industrial Labor Unions Federation of Chemical Industry Labor Unions Federation of All Chemical Industry Labor Unions	National Federation of Chemical Workers Unions
Belgium		Chemical branch of General Union	Catholic Chemical & General Union
Netherlands	Chemical branch of Unity Trade Union	Chemical Industry Group of General Industrial Union (ABC)	Chemical Industry Group of Netherlands Catholic Workers Union Chemical Industry Group of Christian Industrial Union (Protestant)
Sweden		Chemical branch of Swedish Factory Workers' Federation	
Switzerland			Chemical branch of Swiss Trade Union Federation
India	Chemical branch of All-India Trade Union Congress	Various chemical unions affiliated with Hind Mazdoor Sabha and Defense Employees Union	Various chemical unions affiliated with Indian National Trades Union Congress

Here's How TVA Power Sales to Chemical Companies Have Been Running (in kwh.)

	1953	1954
Air Reduction Co.		
Calvert City, Ky.	65,190,000	283,331,000
Aluminum Co. of America		
Alcoa, Tenn.	1,471,000,000	1,373,000,000
Monsanto Chemical Co.		
Columbia, Tenn.	895,350,000	976,611,800
National Distillers Products Co.		
Huntsville, Ala.	53,873,252	78,272,035
Pennsylvania Salt Mfg. Co.		
Calvert City, Ky.	6,604,440	64,756,320
Pittsburgh Metallurgical Co.		
Calvert City, Ky.	284,274,398	264,838,997
Reynolds Alloys Co.		
Sheffield, Ala.	106,560,361	105,929,598
Reynolds Metals Co.		
Sheffield, Ala.	940,120,000	1,013,860,000
Shea Chemical Corp.		
Columbia, Tenn.	74,074,800	215,600,000
Tennessee Copper Co.		
Copperhill, Tenn.	116,134,379	118,183,000
Texas Eastern Transmission Corp.		
Barton, Ala.	47,483,079	26,130,140
Gladville, Tenn.	32,600,844	21,959,663
Union Carbide and Carbon Corp.		
Electro Metallurgical Co., Div.		
Sheffield, Ala.	463,680,286	439,475,859
National Carbon Co., Div.		
Columbia, Tenn.	141,419,041	182,405,381
Victor Chemical Works		
Mt. Pleasant, Tenn.	392,568,000	363,430,000
Other Industrials	18,197,602	15,787,572
Total Industrials	5,109,130,482	5,543,561,365
Federal Agencies	6,966,813,871	11,800,053,251
Total Industrials and Federal	12,075,944,353	17,343,614,616

More Buyers, Same Supply

The Tennessee Valley Authority is facing the biggest supply-demand headache of its career this week—one that may mean continuing trouble for TVA's chemical power customers unless a solution is found soon.

Federal money to expand generating capacity has become harder and harder to unfetter, at the same time that government and private demands (both industrial and residential), have been increasing. Result: TVA, its supporters in Congress, and its customers in the Tennessee Valley are jointly concerned about an impending power crisis.

Stepped-up consumption of electric energy by the chemical industry itself illustrates the situation. Industrial chemical users increased their direct consumption of TVA power during fiscal 1954 by 267,670,263 kwh. over fiscal 1953 (*see chart*).

In its annual report TVA makes several warnings quite clear:

• Generating capacity under construction will provide an assured load-carrying ability for the system of 9,443,000 kw. by the end of calendar 1956. This will enable TVA to meet its power requirements at that time by only the narrowest of margins, and makes no provision for meeting the additional power requirements forecast for 1957 and 1958.

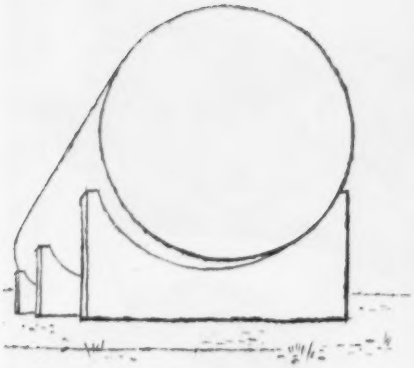
• Hydroelectric development of the Tennessee River's potential is substantially complete. This means that any substantial new development on the river must be in the form of steam plants.

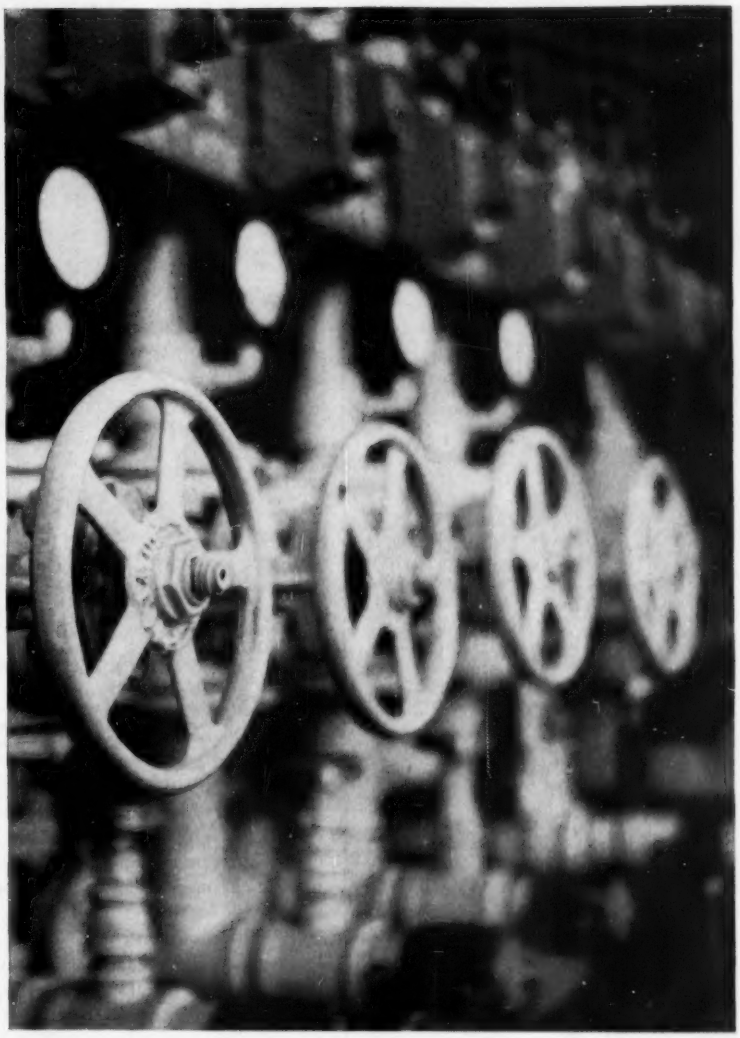
TVA asked the Budget Bureau last year to approve an appropriations request to finance 1,395,000 kw. of new capacity through construction of a new steam plant at Fulton, Tenn., and additions to three other steam installations. The Administration turned thumbs down on the request and instead ordered the Atomic Energy Commission to sign a contract with a private combine for an additional 600,000 kw. Out of the refusal, the now-famous Dixon-Yates fight developed, with the result that, even if the plan goes into effect, initial production of power may be delayed until 1958.

The Dixon-Yates squabble, moreover, adds a further note of urgency to the already dire prediction of an imminent shortage of power in the area. There is not only a recognized need for power in the Valley now (based on plans of existing industries and normal load growth of residential areas), but also the prospect of new industrial customers locating in the area. Possible expansion of atomic energy installations could create other trouble spots, too.

Outlook Only Fair: To chemical companies directly concerned with power from TVA, the Republican-Democrat compromise now under consideration offers at best a faint ray of hope. Both sides are talking about divorcing TVA from the U.S. Treasury and having it pay its own way (through authority to issue revenue bonds), but no one's sure where the chips will fall once the real negotiations get under way.

Congress, or the Administration, or both, are ultimately charged with doing something about the TVA problem. But, no matter which course is chosen, the future of industrial use of TVA electricity is at stake. And industrial users themselves are the eventual winners or losers.





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chemical intermediate
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IN OVERSEAS OPERATIONS, drugmakers see a . . .

Dangerous Portent Looming

Loud roars—like political speeches—can be sorely misleading. But one clamor that will emanate from pharmaceutical companies in the months ahead will be the result of a real and legitimate complaint.

Patent infringements abroad are on the rise, and U.S. companies are facing staggering dollar losses from usurped sales, and mounting legal costs to fight violations.

Commenting on the touchy situation, one patent manager (charged with protecting close to 50 overseas operations) says candidly, "Of course we always have perpetual policing problems with our overseas patents, but now we're receiving more complaints than ever of pirating and infringing. And we're expecting more in the near future." Another patent director says angrily, "For the most part, foreign infringers are trying to cash in on our new developments without proper licensing. We foot development costs, they cash in on sales."

What Stirs Complaints? While it's virtually impossible to anticipate specific infringements, U.S. pharmaceutical producers are sure that increased violations are in the offing. Why? Mainly because greater manufacturing activity abroad (especially in chemicals and pharmaceuticals) automatically induces a high frequency of violations. Some breaches, it's true, are unwitting. Not infrequently, however, deliberate attempts are made to capitalize quickly on promising U.S. medicinals.

Too, antiquity of patent laws (or often the complete lack of any law) encourages infringements.

Worst Offenders: Needless to say, not all countries are completely lax in patent protection, mainly because the indigenous pharmaceutical companies themselves demand protection (e.g., West Germany, Great Britain, Switzerland).

Italy, on the other hand, rates as one of the worst offenders—it has no patent system to cover medicinals, for either Italian or foreign firms. Main opposition to initiating effective legislation has emanated from some Italian drug firms, which flatly oppose issuance of patents to "outside" groups. Other companies—like giant Montecatini—have long been pressing for drug legislation. So far, however, they've largely been stalemated, much to the concern of U.S. businessmen.

Difficult policing problems face U.S. drugmakers in Latin America, too. Infringement cases are apt to bog down in complex legal proceedings, sometimes drag on for five years. As

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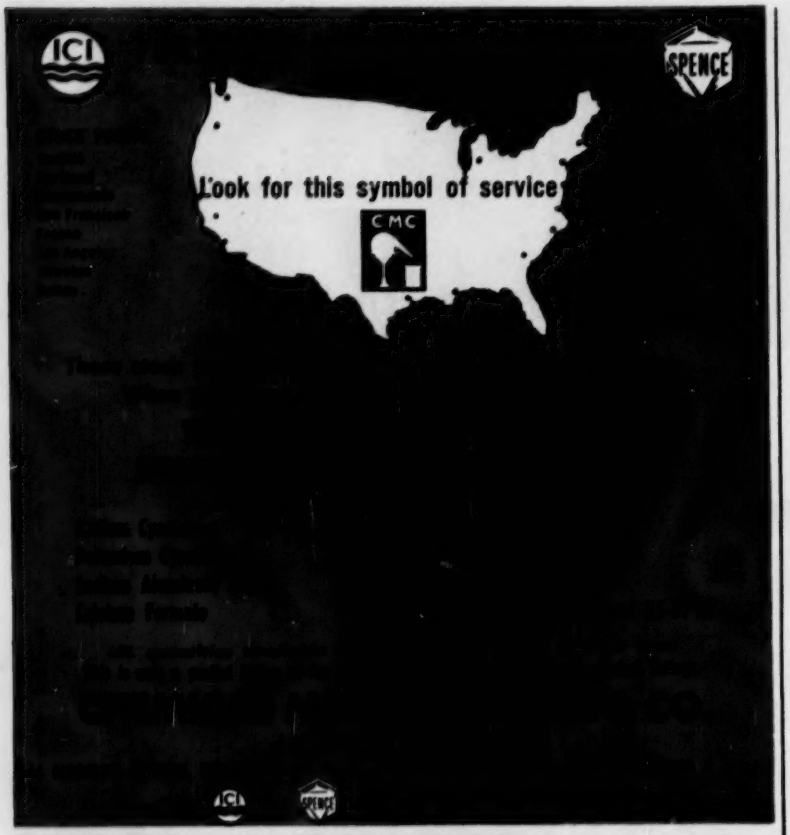

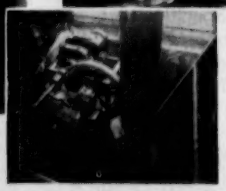

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one Sharp & Dohme executive admits: "It's so expensive to sue infringers in South America today that no company can really afford to thrash through to a decision." Result: restitution for patent piracy in South America is virtually nonexistent. The only saving factor: infringers' production is relatively small, so actual sales losses are slight.

In other, less industrialized areas, the problems are also acute. Some 10 countries (aside from Italy) issue no drug patents whatsoever, and seem hardly likely to do so in the foreseeable future. That leaves U.S. firms in limbo —with no legal grounds on which to fight the infringements. Vocal protests are at best merely diversionary tactics to deter unlicensed firms from pirating on a large scale.

Surprisingly enough, even Great Britain (with its highly protected drug industry, and stringent patent laws) is causing alarm among a number of U.S. manufacturers.

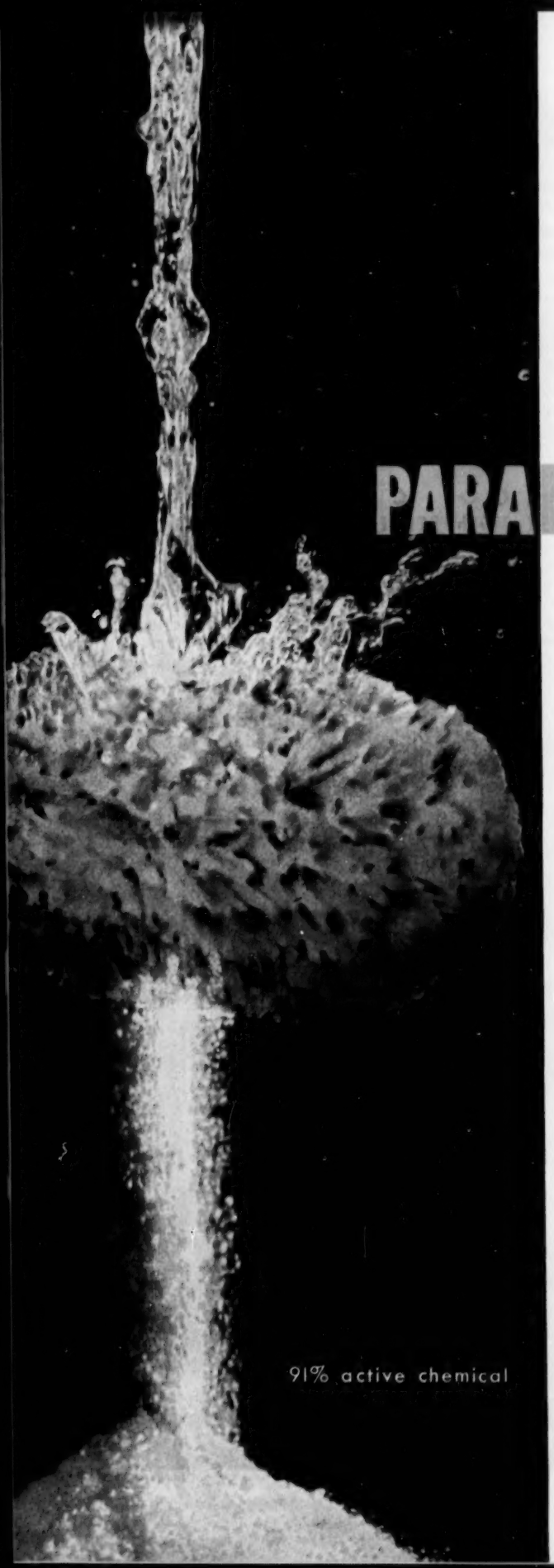
In the past few months, British pharmaceutical makers have been taking advantage of an old "compulsory" licensing law, forcing the hand of U.S. manufacturers who are reluctant to grant them process rights. Once a patent has been given to a foreign company by the British government, the patents controller may order that company to grant a license to any English manufacturer who wants one. He may even establish royalty agreements if both companies concerned cannot successfully arrive at a decision themselves. The only other alternative offered to firms not accepting this compulsory license arrangement: no compensation whatsoever.

Eyes and Ears: In the face of all these difficulties, U.S. drugmakers can do but little to minimize infringements.

Essentially, they can only attempt to set up more efficient "watchdog" forces, and hope that such tactics frighten off offenders. In addition, forceful prestige-building can help strengthen their position.

Right now, these are the only weapons pharmaceutical firms have to fight the out-of-court patent battle.

But, with the whole problem assuming such importance, there's little doubt they'll have to dig harder for more effective means to strike at the infringement menace sometime in the very near future.



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Nine roof-mounted Dracco Filters ventilate spray booths and recover porcelain enamel dusts worth some $36,000 per year. Returning clean, filtered air to the plant saves on heating costs.

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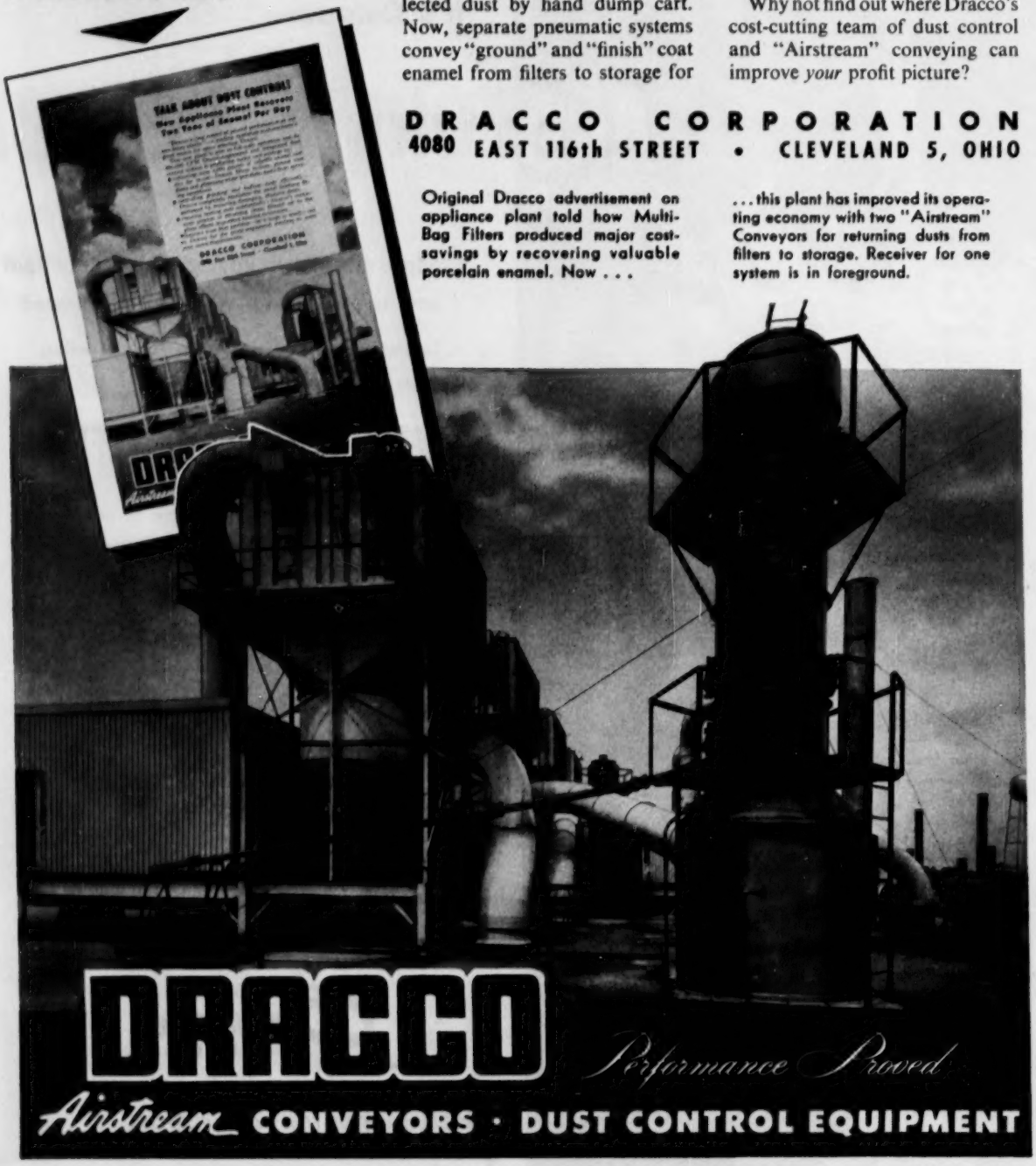

Original Dracco advertisement on appliance plant told how Multi-Bag Filters produced major cost-savings by recovering valuable porcelain enamel. Now . . .

. . . this plant has improved its operating economy with two "Airstream" Conveyors for returning dusts from filters to storage. Receiver for one system is in foreground.

ANTITRUST BOX SCORE
for 1954

New cases started:	
Civil	23
Criminal	12
TOTAL	**35**
Old cases concluded:	
Civil—	
by consent decrees	30
by judgments favorable to the government	3
by judgments favorable to the defendants	1
by dismissal	4
	38
Criminal—	
by pleas of "guilty"	3
by "nolo contendere"	11
by verdict of "guilty"	1
by dismissal	1
	16
TOTAL CONCLUDED	**54**

LEGAL . . . . . .

Dwindling Backlog: The new plan for negotiating consent settlements before complaints are filed is making it possible for the Justice Dept.'s Antitrust Division to whittle down its backlog of pending lawsuits. That's the word from Assistant Attorney General Stanley Barnes, whose year-end report also shows an awareness of future antitrust problems that may have their origin in current mergers. "The continuing trend toward mergers and consolidations of business units," Barnes remarks, "has made the study of such developments of particular importance in the enforcement of the antitrust laws." Barnes cited the recent Eastman color film case (*CW, Jan. 1, p. 13*) as an example of the new "negotiate first" system, which enabled the division to reduce by 19 its number of untried cases (*see table, above*). This new procedure, Barnes said, now has been used in 10 cases.

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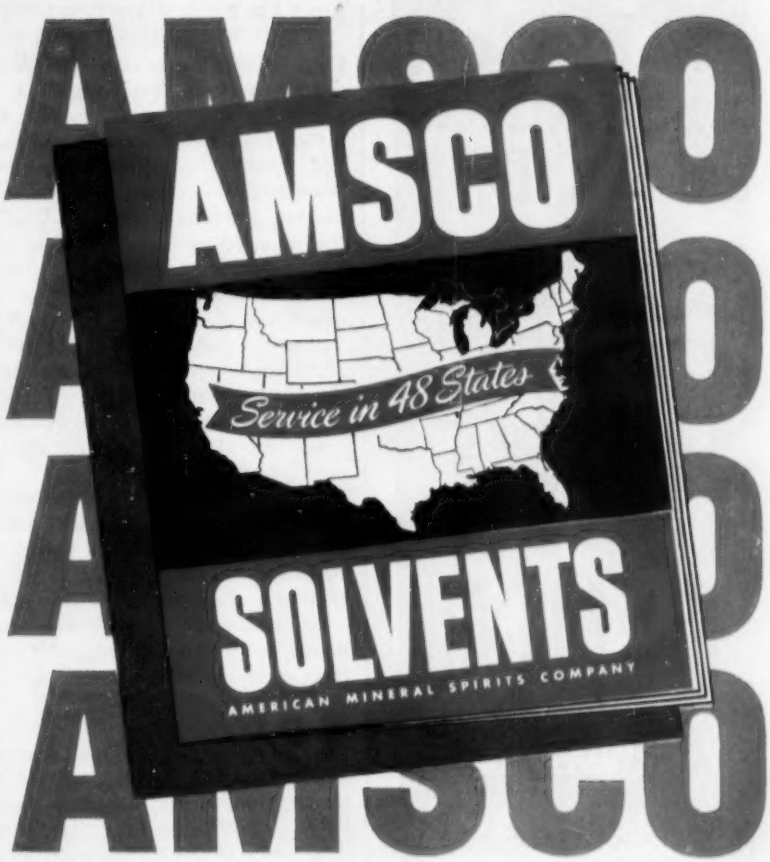
Private Antitrust Suit: A company or an individual also can file an antitrust suit, and that's exactly what Asbestos



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Corp. of America has done. In federal district court at New York, ACA is asking for a total of more than $2 million from Johns-Manville and two J-M affiliated companies, charging "monopolization, attempted monopolization, and conspiracy." ACA says that it acted as a distributor of asbestos fiber for J-M from 1929 until 1950, and that J-M had agreed not to solicit any of ACA's customers. But during the past five years, the complaint continues, J-M has been selling directly to Kentile and other former ACA customers, and has reduced discount percentages to ACA but not to other distributors.

Of total production of asbestos fiber, about 60% comes from Canada, and 70% of that Canadian output is controlled by J-M, says ACA. Only about 4% of output is from the U.S.

Johns-Manville officials declare there's no basis for the suit, and say their company will fight the suit to the end.

•

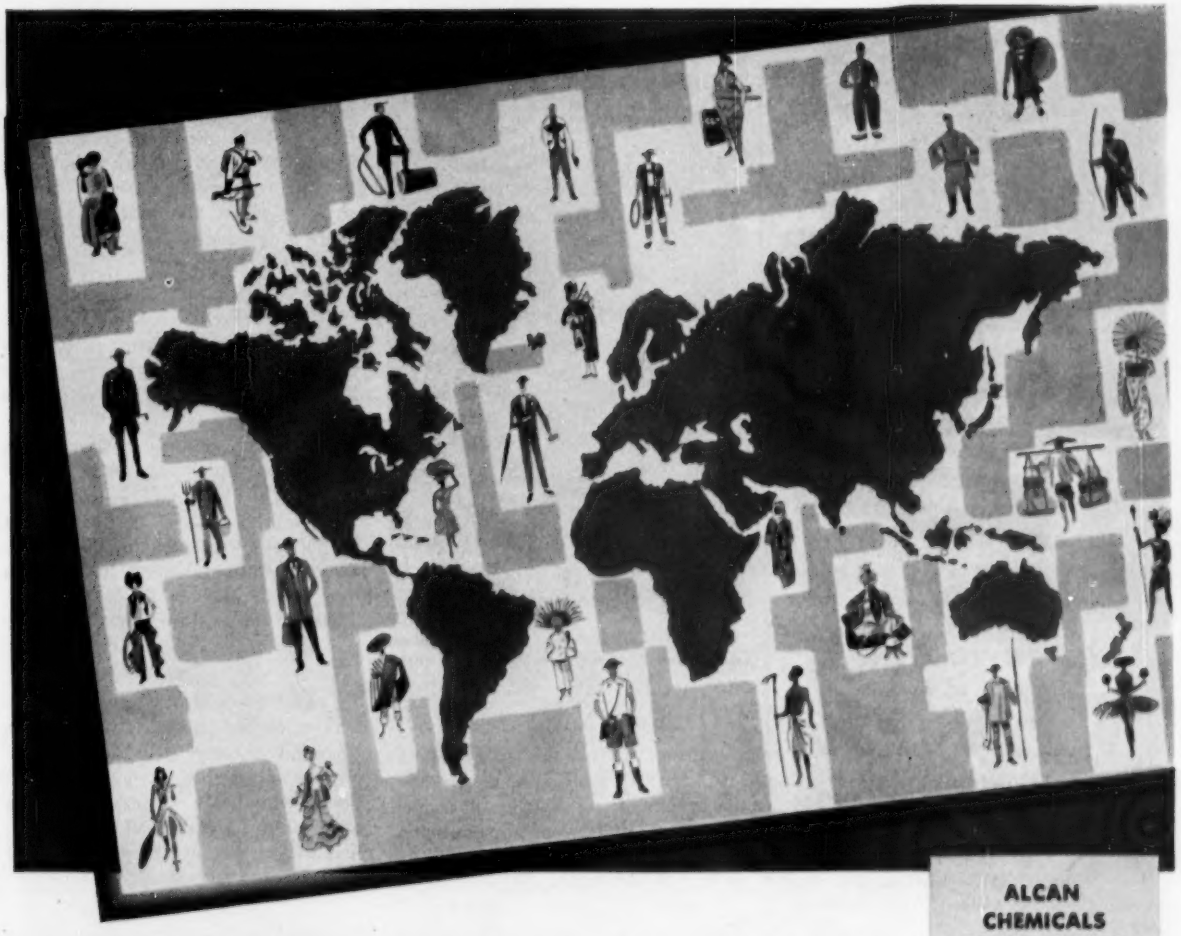
Rails vs Trucks: Two railroad companies are challenging the right of a trucking firm to haul phosphate from Pierce to East Tampa, Fla. The Atlantic Coast Line and the Seaboard Railroad have filed suit in state circuit court at Tampa asking that Haulsmore, Inc., be enjoined from trucking the phosphate without a certificate of public convenience from the Florida Railroad & Public Utilities Commission. Haulsmore's position is said to be that its phosphate operations come under a law that exempts from the commission's jurisdiction certain casual or seasonal movements of freight.

•

Ship Workers' Suits: A chemical testing service is involved as third-party defendant in a double-barreled civil suit based on death of two ship workers. Administrators of the two workers' estates are suing the owners of the SS *Golden West*, on which the men had been doing repair work at Hoboken, N.J.; and the ship owners in turn are suing the Bethlehem Steel Co. (prime contractor for the repair job), the C. & W. Ship Scaling & Service Co. (an independent contractor), and the Marine Chemists Co., New York. The contract called for Bethlehem to provide chemists to make sure that the ship's tanks were gas-free, and the plaintiffs are alleging that the deaths were the result of asphyxiation due to failure to make the compartments gas-free. In reply, Marine Chemists Co. asks for dismissal of the case, asserting that if the accidents took place as stated in the complaint, it must have been due to the workers' own negligence.

Good Neighbor Policy

IF FIRE BREAKS OUT at the plant of American Cyanamid's Lederle Laboratories Division at Pearl River, N.Y., fire equipment from neighboring towns will come to help as it did on the trial run when this picture was taken. The "mutual aid pact" provides that fire companies from Pearl River and Nanuet will come to the aid of the Lederle plant force headed by Chief Lester Shuart, if needed.



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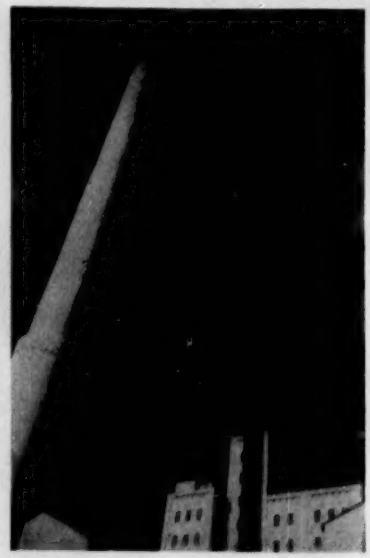

TATA CHEMICALS: Still struggling with shortages of crudes and capital.

FOREIGN . . . . . .

Expansion/India: India's chemical industry, which embarked on an ambitious program last year, is still bogged down by a number of apparently insurmountable shortages. Certain important basic commodities (such as gypsum sulfur, pyrites, and rock phosphate) remain scarce; there's a serious shortage of technical manpower (in the absence of which Indian manufacturers are hesitant to open up new plants); and easy expansion capital isn't available (with which chemical companies can afford to brave the threat of potential nationalization).

"Lack of knowledge," says P. A. Narielwala, director of Tata Chemicals, India's largest soda ash producer, "is the main obstacle to expansion today."

Ambitious government projects only emphasize the problem, since most independent firms are reluctant to sink more money into capital equipment when it looks as though they'll be facing nationalist competition soon.

"The answer," continues Narielwala, "isn't easy to find." India, despite heavy United Nations aid, seems certain to face a period of sporadic chemical expansion activity.

•

DDT/Egypt: Work has started on a plant at Kafr El-Zayat (Egypt) designed to produce sufficient DDT to meet that country's current insecticide requirements. Both the United Nations Technical Assistance Administration and the United Nations Children's Emergency Fund (UNICEF) have had a hand in financing the project; construction work should take about a year. Estimated plant capacity: 700 tons of DDT annually.

•

Phosphates/French North Africa: Exports of North African phosphates continue to reach record levels. In the first 11 months of 1954, phosphate exports topped 3.25 million tons—more than the entire year's exports in 1951, the previous annual record high.

In Tunisia, North Africa's largest producer, Compagnie des Phosphates de Gafsa alone shipped 1.35 million tons for the 11-month period—an increase of 340,000 tons over the same period in 1953.

•

Fertilizer/Sweden: Svenska Salpeterverken, owned jointly by the Swedish Cooperative Union (KF) and the Federation of Swedish Farmer's Associations, will build a fertilizer plant outside Stockholm slated for completion within the next 18 months. Estimated cost: $5.2 million.

•

German-French Collaboration: Fears that France and Germany will successfully block attempts to liberalize European trade are causing concern in Europe this week—especially among the Benelux countries. Though Dutch Foreign Minister Beyen and Belgian Foreign Trade Minister Victor Larock both have said that a mere trade pact between France and Germany won't necessarily damage Benelux trade, the fear's growing that such a pact might be more than an ordinary trade agreement. If long-term contracts are formed between the two countries at an Economic Council level, one spokesman points out, it will mean that no use can be made by other nations of the most-favored-nation clause, and GATT will have been stultified.

Chemical companies in Belgium and the Netherlands are particularly concerned about the possibility of wide German participation in the French chemical industry, see a threat of being squashed between "a growing Franco-German mammoth on the one hand" and the British commonwealth companies on the other.

In the starred area above, construction has started on the new five million dollar plant for the commercial production of the Nitroparaffins and their remarkable family of derivatives. The new plant, the first major step in the company's Nitroparaffin expansion program, is expected to go on stream August 1955.

Located at Sterlington, Louisiana, the new plant is surrounded by CSC's great petrochemical facilities, from which such useful and basic products as methanol, ammonia, and nitric acid flow to all industry. In addition to the new NP plant, existing facilities at Peoria, Illinois, are being expanded.

Virtually laboratory curiosities a few years ago, the Nitroparaffins have been under study since 1935 in a continuing program of experimental production and evaluation. The four Nitroparaffins and six derivatives, which have already been produced and been proven useful in a wide range of applications, represent only a small fraction of the total number of derivatives under current investigation. The new chemicals represent a unique field of organic chemistry and hold unusual promise for virtually every industry.

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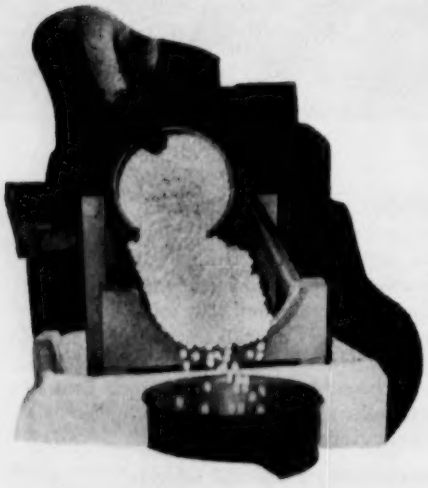

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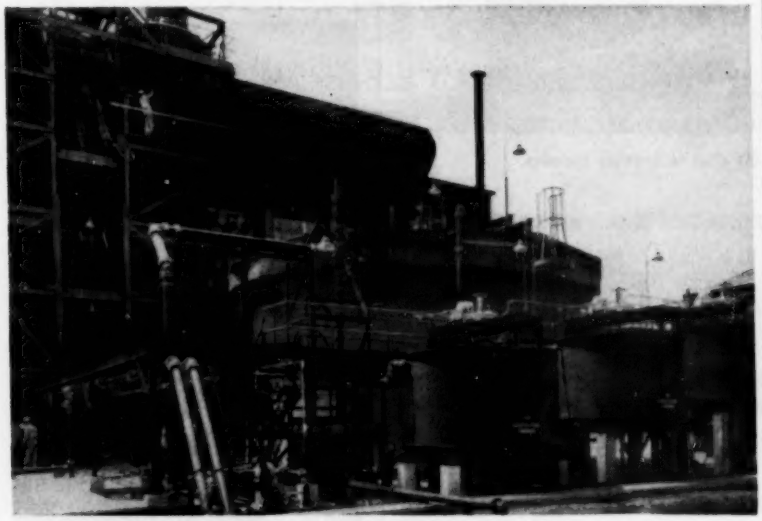
Portland, Ore. Greensboro Charlotte Richmond Atlanta
Los Angeles Columbus, Ga. New Orleans Chattanooga Toronto

Allied Chemical



CHEMICAL EQUIPMENT: For users, two questions that can lead to . . .

Lingering Lawsuits

To play it safe, better keep in touch with your lawyer as well as your engineers when you buy new chemical process equipment.

That would seem to be the moral of all the litigation over such equipment in recent weeks. It appears that a chemical company should be ready for court action if there's any doubt about either of these two questions regarding a piece of equipment:

- Does it work properly?
- Is it clear of patent controversy?

Who's at Fault: Example of a case based on that first question is the lawsuit filed last month in U.S. District Court in New York by Hatco Chemical Co. (Fords, N.J.) against Superior Combustion Industries, Inc. (New York).

Hatco says that when it bought a steam generator and condensate tank from Superior back in Aug. '53, Superior warranted that the tank was suitable for Hatco's purposes and agreed to replace any defective parts of the generator. However, Hatco continues, the tank did not prove suitable, and had to be replaced at a cost of $923.70; defects in the generator necessitated a $2,807.88 repair job; and while the repair work was going on, the plant had to be shut down, resulting in a $9000 loss of production.

In reply, Superior suggests that the equipment wasn't used correctly. Superior says it will contest the suit vigorously because the trouble must have been boiler tube corrosion that should have been prevented by a certain feed water treatment, as prescribed in instructions.

Who's Entitled to Patent: Lawsuits over equipment performance turn up less frequently than cases based on the patent controversy. Even though equipment patent controversies are not uncommon, it's seldom that licensed users of such equipment are involved.

One exception: the litigation between Houdry Process Corp. and Socony-Vacuum Oil Co., in which Houdry wants satisfaction for use of a certain type of moving-bed catalytic cracking equipment by some 40 firms licensed by Socony-Vacuum. Houdry insists this technology was divulged to Socony-Vacuum only for its own use, not for licensing to others. Socony-Vacuum's answer: that the equipment in dispute was developed by Socony-Vacuum, not by Houdry.

A somewhat similar suit is pending between Hydrocarbon Research, Inc., and M. W. Kellogg Co. over equipment for separating oxygen from air. Hydrocarbon is attacking the validity of Kellogg's Trumpler patent No. 2,460,859, and is asking that Kellogg be enjoined from threatening to sue process companies using oxygen equipment designed by Hydrocarbon. However, that patent recently got priority in an interference proceeding, and an out-of-court settlement now appears likely.

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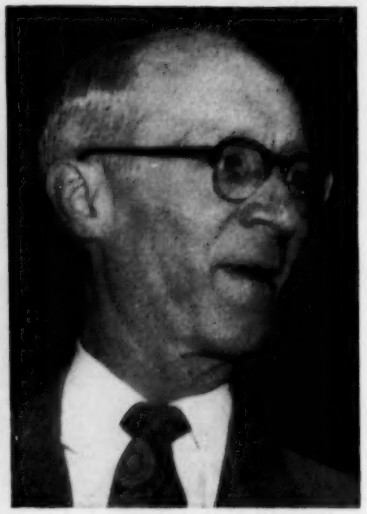

OWIU'S KNIGHT: After defeat at polls, a limited victory on technicality.

Ban on Money Talk

You can set up a company-sponsored employees' committee in your chemical plant, but that committee isn't supposed to bargain on wages and hours. That's the kernel of the ruling by National Labor Relations Board trial examiner Charles Schneider to the effect that Texas City Chemicals, Inc., should disband its advisory council of employees. His order goes into effect Jan. 31 unless the company asks for a review by the board.

The council was organized by Robert Seyfried, company production coordinator, who conducted elections among employees to decide who would represent workers in each of the plant's four sections. The company provided funds and physical facilities for the council, whose purpose, Seyfried explained, was to present employee views and complaints to management. But in checking the minutes of council meetings, the NLRB examiner found that the council also had discussed overtime pay, wages, seniority, hours of work, and working conditions.

These activities, Schneider holds, make the council a "labor organization" as defined in the Taft-Hartley law—which makes it illegal for an employer to "dominate or interfere with" such an organization.

The hearing had been requested by O. A. (Jack) Knight's Oil Workers International Union (CIO), which had tried to unionize the plant last year and failed.

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(di-iso-octyl phthalate)

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Look to ENJAY for better iso-octyl and decyl alcohols for better plasticizers

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Be sure of dependable high quality—ask *your supplier* for these plasticizers made from Enjay Alcohols. Enjay and its affiliates do not manufacture plasticizers.

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ENJAY IS THE PIONEER AND THE WORLD'S LARGEST PRODUCER OF ALCOHOLS BY THE OXO PROCESS

where HARD RUBBER is right . . .
use it!

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. . . can't hurt
ACE molded parts

Because ACE hard rubber is completely unaffected by most chemicals and doesn't object to water in the least, it's ideal for parts like this rayon candle filter.

One of the strongest plastics (tensile up to 10,000 psi.), ACE hard rubber is good for *tough* jobs, too. Easy to machine (the threads above, for example), easily polished (like your faithful ACE comb), it does a better job at lower cost in thousands of parts from bearings to magneto parts and water meter pistons. We can mold it for you, extrude plain and fancy shapes, supply sheets for punched parts, line or cover metal with it, and even make large, intricate parts by hand-wrapping.

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93 WORTH STREET · NEW YORK 13, N. Y.

NAM'S RITER: On industry, he pins responsibility to defend 'right to work.'

LABOR . . . . . .

Prompt Reply: Quick to react to Labor Secretary James Mitchell's recent attack on the "right to work" laws now in effect in 17 states was the National Assn. of Manufacturers, whose President Henry Riter III says that Mitchell's remarks have confronted the U.S. people with a serious challenge to their liberties.

"American industry," contends Riter, "has a direct responsibility to do its utmost to protect its employees in the right to obtain and hold jobs without compulsion to join or not to join any organization."

NAM's four-page folder titled "Do We Have the Right to Work?" comes just as a branch of the Republican central committee in Iowa is proposing modification of that state's present right-to-work law. Under the plan suggested by the Iowa Republican Labor Council, the law would be changed to permit management and unions to bargain for union shop agreements.

•

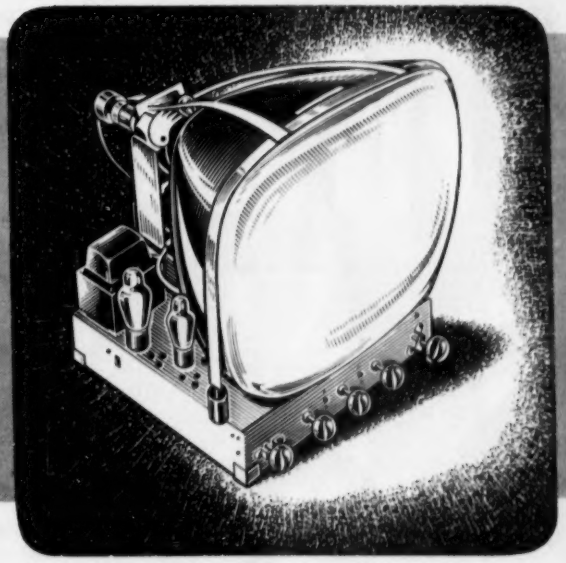
Profit Sharing: Two engineering firms that serve chemical plants have started the New Year by adopting new profit sharing plans for their employees. Catalytic Construction Co. (Philadelphia) has put into effect a profit-sharing retirement plan that initially covers 400 office and field employees, with other employees becoming eligible after completion of 36 months of credited service. Electronic Engineer-

For your precision electronic tubes and screens—

High Purity

Baker ELECTRONIC CHEMICALS

Aluminum Nitrate
Aluminum Sulfate
Ammonium Hydroxide
Ammonium Phosphate
Antimony Trioxide
Barium Acetate
Barium Aluminate
Barium Carbonate
Barium Nitrate
Barium Tungstate
Cadmium Chloride
Cadmium Sulfate
Cadmium Sulfide
Calcium Carbonate
Calcium Chloride
Calcium Fluoride



Calcium Nitrate
Magnesium Chloride
Magnesium Oxide
Manganous Carbonate
Phosphoric Acid
Potassium Hydroxide
Radio Mixtures
Reagent Grade Acids
Silicic Acid
Sodium Hydroxide
Sodium Phosphate Dibasic
Strontium Carbonate
Strontium Nitrate
Zinc Nitrate
Zinc Oxide
Zinc Sulfide

New standards of precision have marked the rapid growth of the booming electronics industry. To help attain those standards, chemical purity is highly essential for phosphors, emission coatings, activating agents, etc.

J. T. Baker Chemical Co. has long supplied tonnage chemicals of controlled purity and physical uniformity for industries where precision is the key word.

In the electronics industry Baker has worked closely with engineers in supplying their high purity chemical needs for radar, radio and television equipment.

Now, with the increasing production of high fidelity equipment and the development and perfection of color television there are new challenges of tolerances that Baker is well equipped to handle.

Some of the Baker Chemicals popular with the electronics industry are shown on this page. As your electronics development work requires these or other chemicals to precise standards, Baker is your logical source of dependable supply.

J. T. Baker Chemical Co., Executive Offices and Plant, Phillipsburg, N. J.

Baker Industrial Chemicals

"Purity by the ton"

Baker

FLAME RESISTANT
with
FR-28
NO LOSS OF
WASHABILITY
COLOR QUALITY
OR COVERAGE
PROOF of PROTECTION!
This wall board panel, coated with paint containing new FR-28, was scarcely affected by flame test of Fed. Spec. SS-A-118b conducted by a nationally known, independent laboratory. Note 10-inch limit allowed by this specification.
FR-28
PAINT MAKERS...
Here's Important News for You!
Now you can offer a truly flame-resistant washable paint—a coating that will easily pass flame tests of Fed. Spec. SS-A-118b and Commercial Standard CS 42-49 by using this additive specifically developed for your needs. FR-28 means safety—proved superior by impartial tests. FR-28 goes into solution fast—simple equipment does the mixing—finished product applies in conventional sprays. FR-28 as a "Silent Fireman" is always guarding against flames!
FR-28 Features:
Safety—a Class C (slow-burning) material.
Compatibility with most latices.
High B_2O_3 content—approx. 66%.
Quick Solubility—a powder.
PACIFIC COAST BORAX CO.
DIVISION OF BORAX CONSOLIDATED, LIMITED
630 SHATTO PLACE, LOS ANGELES 5, CALIF. • 100 PARK AVENUE, NEW YORK 17, N.Y.

B & I . . . . . .

ing Co. of Calif. (Los Angeles) has a quarterly profit-sharing bonus plan that will operate in addition to the profit-sharing retirement plan started two years ago.

•

They Knew What They Wanted: Two locals of United Gas, Coke & Chemical Workers (CIO) have shown determination to get specific terms in their new contracts: Local 600, as bargaining agent at Linde Air's plant at Kittanning, Pa., negotiated for five months, then struck for 10 days to get stronger seniority rights and a new evaluation of all job classifications, along with a 5¢/hour wage increase. At Marietta, O., Local 470 has assurance from Union Carbide's Electro Metallurgical Co. division that hot lunches provided on overtime shifts will include turkey, chicken, beef or fish, also pie or cake and a candy bar.

KEY CHANGES . . .

Travis V. Rankin, to general sales manager, Pacific Div., and **Walter E. Brewer,** to Central District Sales Manager, Nopco Chemical Co., Harrison, N.J.

Frederic H. Courtenay, to secretary, Federal Chemical Co., Louisville, Ky.

Donald R. Robinson, to director, Overseas Operations, Procter & Gamble Co., Cincinnati, O.

Thomas M. O'Neil, to director and vice-president in charge of marketing, Nuodex Products Co., Inc., Elizabeth, N.J.

R. Allyn Budington, Jr., to treasurer, Rayonier Inc., New York City.

J. W. Miller, to executive vice-president and director, Brea Chemicals Co., Los Angeles.

T. R. Sandberg, to vice-president, manufacturing; **Harry R. Lange,** to vice-president, marketing and finance; and **Steven B. Fiske,** to treasurer, Cutter Laboratories, Berkeley, Calif.

Edwin M. Ott, to product manager, sales, Pennsylvania Salt Mfg. Co., Philadelphia.

R. F. Dettelbach, to field sales manager, plastics; **W. E. Manring,** to sales development manager; and **C. D. Segner,** to manager, plasticizer materials, B. E. Goodrich Chemical Co.

IT PAYS TO SEE VICTOR

VICTOR

Dependable Name in

Chemicals

for 57 Years

MYSTERY SOLVED

Have you been wondering about the mysterious alphabetical letters some gasoline companies use to identify recent developments? One of these designations stands for tricresyl phosphate, used as a new gasoline additive. To make these phosphate additives, chemical intermediates, such as Victor phosphorus chlorides, are required. So, petroleum is still another industry where phosphates are making an important contribution to product improvement. And when it comes to phosphates . . . *it pays* to see Victor.

PHOSPHORUS OXYCHLORIDE—Typical Uses: Intermediate in the production of organic chemicals. Chlorinating agent. Catalyst.

THE WAY TO A MAN'S HEART

You know it! Give a man home-made corn bread or biscuits and you've satisfied him. In the South, most housewives buy their flour and corn meal with the leavening and salt already mixed in by the mill. The special leavening agent used in almost all self-rising products is Victor's V-90. A special phosphate, V-90's action is unexcelled during the critical time of mixing and baking, and uniform results are assured. That's why self-rising sales are booming . . . why *it pays* to see Victor.

MONOCALCIUM PHOSPHATE, ANHYDROUS (Heat-treated) V-90®. Typical Uses: Manufacture of self-rising flour, self-rising corn meal, pancake flour, prepared mixes, and household baking powder. As an ingredient of baking preparations. (U. S. Patents 2160700-1 and 2160232-3)

SOMETHING NEW UNDER THE SUN

Sunshine is fine for growing things, but when vinyl plastics were first introduced, exposure to sunlight caused some of them to discolor and fade. Now, these plastics can be exposed to sunlight and are ideally suited for upholstering outdoor furniture, automobile seats, portable wading pools, and many other uses, thanks to Victor light stabilizers. Once again, an industry found that *it pays* to see Victor.

STABILIZERS—Uses: Light stabilizers for vinyl plastic films and coatings. Used in organosol, latex, plastisol and solvent formulations.

WONDER WHAT THEY'LL THINK OF NEXT?

Phosphates are wonderful chemicals. There appears to be almost no limit to their use in industry. Today, phosphates play an important role in the synthesis of many of the modern "wonder" drugs. Producers of sulfa drugs, atabrine, penicillin, and allergy drugs all use versatile Victor chemicals, and the list is still growing. So, if you have a pharmaceutical problem involving synthesis, you will find *it pays* to see Victor.

PHOSPHORIC ACID—Typical Uses: Manufacture of yeast, sugar, soft drinks, gelatin, and pharmaceuticals. Rust-proofing, chemical polishing, petroleum refining, and manufacture of phosphates, glue, ceramics, metal-treating compounds, and fertilizers.

THE STAFF OF LIFE

To help farmers grow more, with less help, the chemical industry developed liquid fertilizers. Many of these new fertilizers employ Victor's completely soluble ammonium phosphates to provide essential elements for the plant roots. Crops grow faster and yields are increased. The solubility, purity, uniformity, and stability of Victor chemicals are the reasons why many manufacturers of liquid fertilizers find *it pays* to see Victor.

AMMONIUM PHOSPHATES—Typical Uses: Ammoniated dentifrices, soda cracker pH control, catalyst for resins, chrome dyeing of wool, one-bath dyeing of Dacron-wool blends, flameproofing, plant nutrient solutions. Manufacture of yeast, vinegar, bread improvers, and alcohol. Acid cleaner for metal.

IT PAYS TO SEE...

VICTOR

Dependable Name in *Chemicals*

for 57 Years

VICTOR CHEMICAL WORKS

155 N. Wacker Drive, Chicago 6, Illinois

THIS YARN DOESN'T HOLD WATER

Nothing raises the temperature of "the little weaver" like having her pretty nylons splashed. To calm female tempers, hosiery makers looked for a splash-proofing agent that would prevent water from spotting the surface of nylons. Victor aluminum formate provided the answer . . . the same answer that helps clothing manufacturers keep their products water-repellent. If you make a product that will be better if it is water-proof or splash-proof you'll find *it pays* to see Victor.

ALUMINUM FORMATE—Typical Uses: Water-proofing, anti-perspirant compounds.

plants and offices of VICTOR CHEMICAL WORKS

† Sales Offices

* Plants

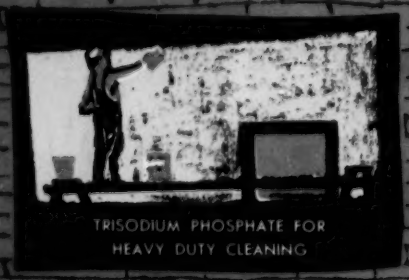
if **SOAP** *or* **DETERGENTS** *are your special interest . . . be sure to see the next page*

it all comes out in the wash

There is a simple explanation for the spectacular growth of synthetic detergents or "syndets" . . . they do an outstanding job of washing clothing, dishes and floors, even grimy automobiles. In the formulation of heavy-duty detergents leading manufacturers rely on Victor for sodium tripolyphosphate, and tetrasodium pyrophosphate. These polyphosphates have remarkable properties of water softening and peptizing—a major requirement of these modern time-savers. Other Victor sodium phosphates are used depending on the cleaning job to be done. Giving soap and detergent manufacturers what they want . . . when they want it . . . is a prime objective at Victor. For example, in the New York area, covered hopper trucks now make delivery of sodium tripolyphosphate in as little as five hours from our Morrisville plant. Special service like this is just one more reason why "soapers" know *it pays* to see Victor.

VICTOR SERVES THE SOAP AND DETERGENT INDUSTRY: SODIUM TRIPOLYPHOSPHATE—Synthetic detergents, cleaning compounds, and soap . . . POTASSIUM PHOSPHATES—Liquid soaps and washing compounds . . . TETRASODIUM PYROPHOSPHATE—Soap, synthetic detergents, and cleaning compounds . . . TRISODIUM PHOSPHATE—cleaning compounds.

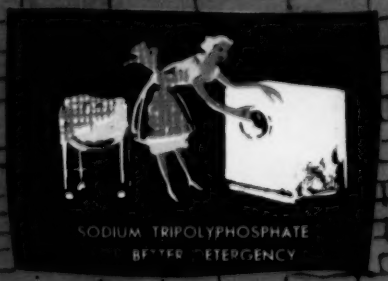
POTASSIUM PHOSPHATES FOR "BUILDING" LIQUID SOAPS



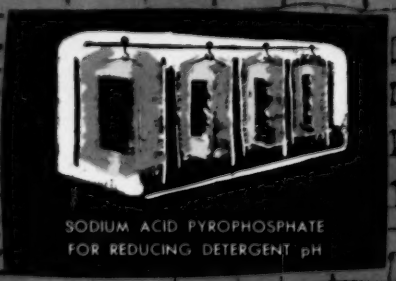
TRISODIUM PHOSPHATE FOR HEAVY DUTY CLEANING

TETRASODIUM PYROPHOSPHATE FOR POWDERED SOAP BUILDER

OXALIC ACID FOR RAILROAD CAR CLEANING

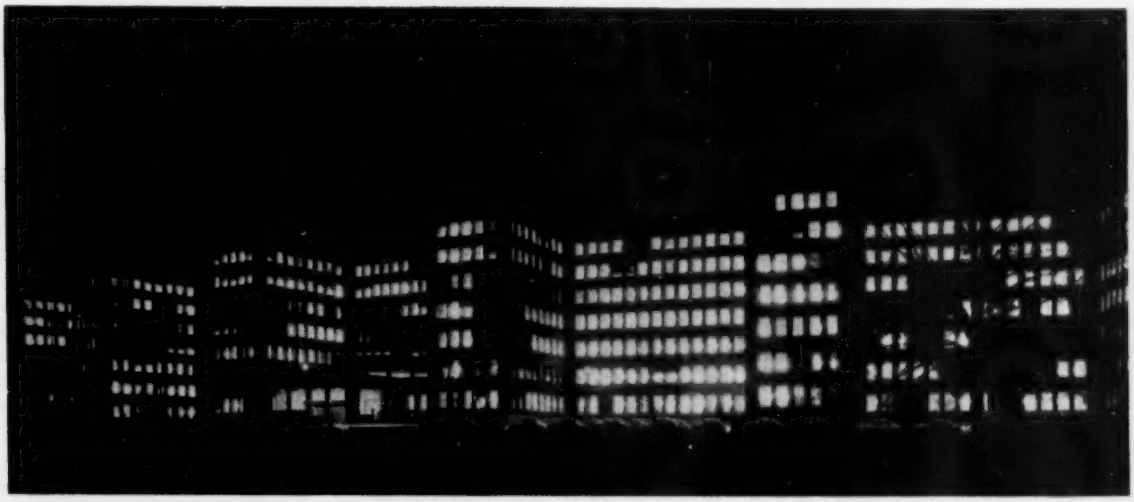


SODIUM TRIPOLYPHOSPHATE BETTER DETERGENCY



SODIUM ACID PYROPHOSPHATE FOR REDUCING DETERGENT pH

PRINTED IN U. S. A.



I. G. FARBENINDUSTRIE HOCHHAUS: Headquarters of a giant.

C W Report

by Karl Falk

West German Chemical Industry: Revamped, Revitalized, Resurgent

Long feared by U.S. chemical men, always a dormant threat, Germany's now making inroads on world markets.

With new plants, rekindled zeal and rising production, it has moved into third place as a chemical exporter.

Here's how it's geared for the battle ahead:

The era of the "4-Ds"—destruction, dismantling, denazification and dispersal is largely a thing of the past for West Germany's chemical industry. And its passing has left the nation in a surprisingly strong position in the struggle for a share of the world chemical market.

There's no doubt that its chemical industry has lost ground to those of other countries. In 1938, Germany accounted for 22% of the world's chemical production; its share is now only 6%. Meanwhile, the United States' share has gone up from 30 to 40%. Though German production exceeds prewar levels by more than one-half, the U.S., in the same period, has trebled its output.

But when you consider that the German industry has been built since

1948—practically from scratch, the recovery is amazing. With over 12% of the world's chemical exports, it has climbed into third place behind the U.S. and Great Britain as a chemical exporter. Chemicals, in fact, have become the Bundesrepublik's second largest export category (behind machinery and ahead of coal).

And in many ways, the German chemical industry is healthier than it ever has been: most of the plants are new or modernized. Every product must stand the sharp test of international competition and no process can now hide behind the old walls of self-sufficiency. It has to be economic.

The Germans, in short, have sharpened their wits and their production methods. Their chief assets: know-how and an eager reserve of skilled labor. Their chief liabilities: higher material and energy costs. To some extent, they've had to turn their backs on coal. Although it's their only plentiful natural resource, coal now costs over four times what it did in prewar Germany. Coke costs over three times what it did previously. And labor, though still cheaper than that in the U.S., is approximately twice as costly as it was before the war.

As a result, they're using natural gas and petroleum (even when the latter has to be imported) and are looking forward to an atomic future; they hope to "leapfrog" beyond the new fuels and raw materials of today into a field in which their technological skills may put them at a competitive advantage.

Confident but Reserved: Although they're heartened by their industry's phenomenal recovery, chemical leaders are not cocky. They have an uneasy feeling that the present boom might not last—especially under present world economic and political conditions. They feel the industry has been helped by the generally increased demand for chemicals at home and abroad, by U.S. aid and by cooperation between West European nations. They also feel the postwar allied collection of information on scientific developments in Nazi Germany helped to make up for lost technical libraries, and to establish some continuity, and proved a useful springboard in the effort to catch up on "lost" years of research.

Industry people feel that except in petrochemicals, some plastics and fibers, Germany is catching up to world leaders again. Research facilities and funds are small compared with those of the U.S. Research expenditures of the "Big Three" I. G. Farben successors (Bayer, Badische Anilin, and Hoechst) amounted to about 5% of sales in 1953. The rate of investment in new facilities (about $666/employee), they estimate to be only one-third that of the U.S. and still below that of England and of the Soviet Union. Right now, shortage of capital is claimed to be one of the chief stumbling blocks to further expansion in the chemical industry, which is operating close to capacity in many plants. Most of the modernization and expansion programs have had to be financed through reinvested profits. However, the Big Three are still doing well, as indicated by rising stock exchange quotations. In 1953, each paid out dividends of 7% and an increase this year is not considered unlikely. (The old I. G. paid 6 to 10% dividends.)

Technology and Trade

Before the war, the flow of patents and licenses in general was out of Germany. Now the situation is sharply reversed. Nearly 20% of the West German patent applications in 1953 were foreign. The year before that, according to the Industrie Institute, the Bundesrepublik took in $9 million from German patents used abroad and paid out $24 million to foreign license and patent holders. Since that time, the flow has increased considerably in both directions.*

The war seizure of patents is still a sore point among Germans and negotiations for recovery are still under way in several countries. Some of the countries have returned them, some have sold them back; others are holding on to them on the grounds that they're war indemnity. And for some of the German companies, confiscation of trademarks was felt more keenly than loss of patents.

Trends in Trade: Exports have always been a much bigger factor in the German chemical scheme than in the U.S. In 1953, West German chemical exports amounted to 22% of the industry's sales (as against 33% in prewar days). Plastics, which account for about 7% of the total value of chemical exports, are growing fast, as are pharmaceuticals and photographic chemicals. However, industrial chemicals, fertilizers, pharmaceuticals and dyes are the backbone of the German chemical export trade. The output (and export) of chemical apparatus has

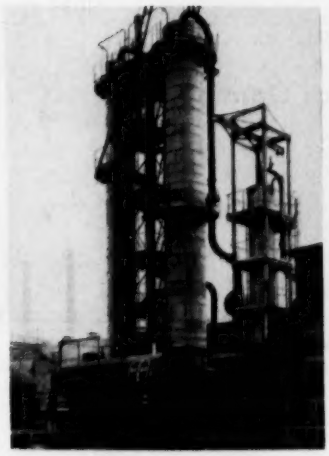
*Actually, however, many of the patents that seem to be coming from abroad are of German origin. For right after the war, some Germans felt it was "safer" to obtain patents in countries like Switzerland.

"In the future, it cannot be overlooked that the American industry, which is itself protected by high tariff walls, will appear more intensely in European and German chemical markets. Germany will accordingly have to prepare for increased competition, which will weaken it economically because of inevitable pressure on price. This pressure can only be met through far-reaching economies and rationalization as well as intensification of all basic and applied research to produce new and constantly improved products. Furthermore, overdue tax reforms and strengthening of the capital market are needed."

—from the annual report of **Chemische Werke Huels.**

West Germany Is Catching Up . . .

. . . In benzene,

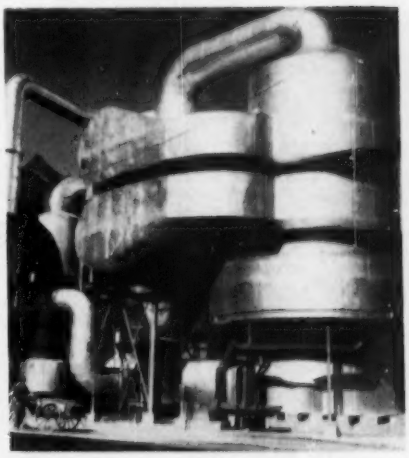


Redistillation at Leverkusen.

. . . nitrogen

Hoechst facilities for storing fertilizers.

and sulfuric



Hoechst contact sulfuric acid plant.

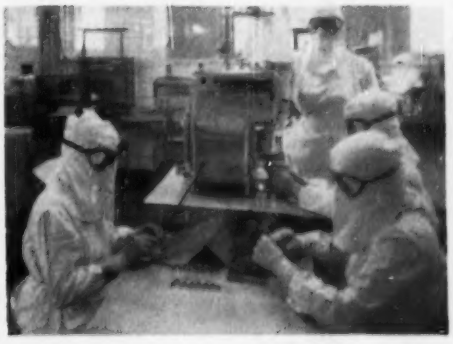
. . . In phosphorus,

Phosphorus plant of Knapsack-Griesheim at Knapsack (near Cologne).

. . . fibers

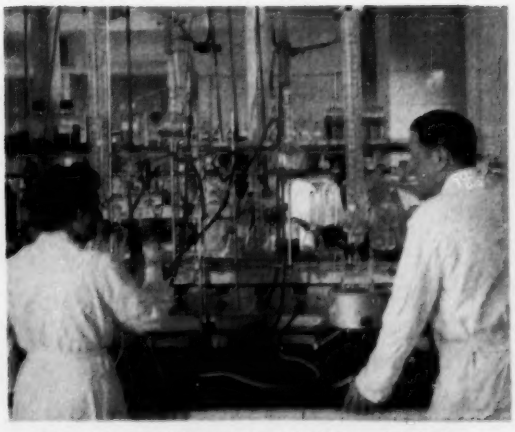
Spin-dyeing of Perlon at Bayer's Dormagen plant.

and pharmaceuticals



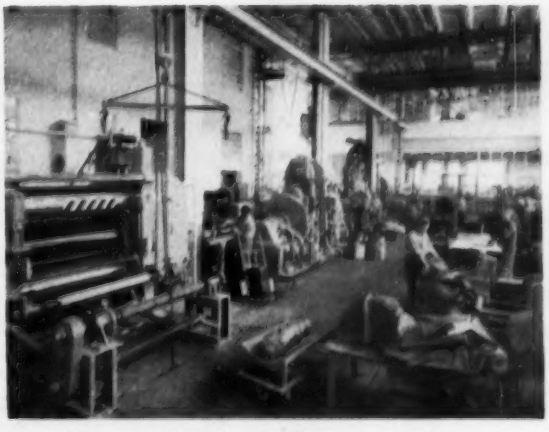
Automatic filling at Leverkusen drug unit.

. . . In research



New lab facilities at Ludwigshafen (Badische).

. . . and development



Experimental rubber facilities at Leverkusen.

West German Chemical Plant Distribution

Chemical Plants Key

	City	Installation
1	Leverkusen	Bayer (main plant)
2	Ludwigshafen	BASF (main plant)
3	Hoechst	Hoechst (main plant)
4	Mainkur	Cassella (main plant)
5	Griesheim	Hoechst subsidiary (electrochemicals)
6	Dormagen	Bayer (fibers)
7	Uerdingen	Bayer (chemicals and dyes)
8	Bobingen	Hoechst (fibers)
9	Bentheim	natural gas and oil
10	Duisburg-Ruhrort	start of oil pipeline to Scholven Chemie
11	Rhine-Herne Canal	start of oil pipeline to Bochum and Hoentrop
12	Darmstadt-Pfugstadt	natural gas
13	Scholven	Scholven Chemie (hydrogenation, benzene)
14	Huels-Marl	Chemische Werke Huels (2 Buna plants)
15	Gelsenkirchen	centralized benzene distillation
16	Bochum and Hoentrop	Bochumer Verein steel plants
17	Homberg	hydrocarbon synthesis
18	Wesseling	petrochemicals
19	Bergkamen	Chemische Werke Bergkamen (Fischer-Tropsch)
20	Elberfeld	Bayer (pharmaceuticals, agricultural chemicals)
21	Marburg	Hoechst
22	Offenbach	Hoechst
23	Gersthofen	Hoechst
24	Knapsack	Knapsack-Griesheim AG, a Hoechst subsidiary (electrochemicals)

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shown a slightly better recovery than the chemical industry in general.

Traditionally, about 60% of Germany's exports go to Europe; the rest, overseas. But the Germans feel that, at least temporarily, they can't increase their exports to other European nations to any great extent. So they're concentrating on underdeveloped areas. Recently, for example, a special issue of *Chemische Industrie* discussed prospects of cultivating chemical trade with Argentina, Brazil, Mexico, and Caribbean countries in the Western Hemisphere; Egypt and the Union of South Africa in Africa; and China, India, Pakistan and Indonesia in Asia. Significantly, although 68% of its plastics exports were inside Europe in 1953, the remainder went to South America (12%) and Asia (10%).

Although chemical exports are still booming, there was a slowing down in the rate of increase during the first half of 1954, when about $300 million in chemicals were exported. (Less than $100 million were imported in the same period.)

Partly responsible for this slowdown was a decline in U.S. imports of nitrogen fertilizers, industrial chemicals, coal-tar dyestuffs, glues and gelatines. The U.S., in 1953, took 8.5% of West Germany's total chemical exports.

Falling Prices: Moreover, volume increases of West German chemicals are bigger than the mere increase in value would indicate. For instance, record sales of 1953 were 17% greater in volume, but only 11% higher in value. The price index for chemicals has shown a steady downward trend during the last three years. It has fallen from approximately 200 in 1951 (1938=100) to about 185—which is considerably below the average for all German industry.

This is due not only to increased efficiency in production, but also to stiffer worldwide competition. Significantly enough, at the same time that U.S. firms are complaining about inroads made on foreign and domestic markets by lower-priced German chemicals, West German firms are complaining that they can't meet the competition of U.S. firms. They're also accusing East German firms of "dumping" chemicals on West German markets.

Accent on Costs: To bring costs down, German chemical engineers are counting on continuous processes to turn out both inorganics and organics. And since the country is still essentially dependent on coal (in spite of its preference for petroleum raw materials), it also feels it cannot afford a great number of small producers.

Moreover, with electric power costs roughly seven times those in Norway, for instance, it realizes that it cannot hope to compete with electrochemical exports from that country.

The best bet, then, for the Germans is to concentrate on process improvements and on high-value products—where material and energy costs can be absorbed. Acetylene from carbide or arc process, for instance, is too expensive for use as a raw material, at least for the cheaper plastics.

Accordingly, the Chemische Werke Huels is directing its research toward combining petroleum and coal chemistry. The first German company to process natural gas on a large scale, it has, since 1946, been making carbon tetrachloride, perchloroethylene, methyl- and methylene chloride and chloroform directly, trichloroethylene indirectly, from natural gas. It gets its natural gas by long-distance pipeline.

West German natural gas production—now 100 million cu. meters/year—is small by U.S. standards. But it's expected to double in the near future.

Wells from the Emsland around Bensheim on the Dutch-German frontier are the biggest single source of natural gas, which is still not avail-

Meet the Author

KARL FALK is well qualified to compare today's German chemical industry with that before the war. Educated in this country, he received his Ph. D. in economics there, and as representative of *Chemical Engineering*, obtained first-hand knowledge of German chemicals.

Professor of Economics and head of the Social Science Division, Fresno State College, Calif., late last year he returned on a Fulbright scholarship to the Technische Hochschule, Stuttgart.

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able in large enough quantities to meet demands as a chemical raw material and fuel.

Germany's raw material difficulties are illustrated by Huels' quest for a cheaper raw material since it resumed Buna S3 synthetic rubber production in 1951. West Germany's rubber demand runs from 60,000 to 80,000 tons/year, and Buna accounts for about 8% of Huels' sales. As the only West German producer of synthetic rubber, Huels estimates it will have to have a plant of at least 30,000 tons capacity per year to be economical. Its problem is that U.S. synthetic rubber can be put down at Hamburg for 60¢/kg. In Germany it can't be produced profitably to sell for less than 70¢/kg. Adopting U.S. processes isn't the answer because raw material costs are much higher. At first, butadiene was to be produced from acetylene. Through using U.S. petroleum cracking processes it was hoped, however, to lower costs somewhat.

Huels is the largest West German producer of synthetic alcohol. If the government alcohol monopoly, from which it has to buy back the alcohol that it has produced, would sell the alcohol to Huels for 5¢/kg. instead of for 25¢, which is the present monopoly price, Huels could also come closer to competing with U.S. producers. About a year ago, an interesting German-French venture was devised whereby France, which has a deficit in synthetic rubber and an excess of alcohol, was to sell surplus alcohol to Huels for less than 10¢/kg. and receive the finished synthetic rubber in return. The scheme fell through, however, largely because of the reluctance of German economic and tax officials to go along with the necessary financial concessions.

In the meantime, Huels has decided to build the 30,000-ton unit anyway, to cost $30-40 million. It will take two years to build and will use latest U.S. methods to produce cold rubber, using petroleum raw materials and imported butane. The German rubber processing industry is financing part of the expansion by placing a 1% assessment against its sales, which should yield $3-4 million/year. The German government generally is also aiding petrochemical production by granting tax and customs preference on benzene and liquefied gas imports if they are to be converted into petrochemical products.

Advances in Aliphatics

Costs of oil, coal, and power—the chemical industry, using over one-fourth the total output, is the largest consumer of electricity in the Bundesrepublik—will to a considerable extent determine how far Germany will go in developing petroleum hydrocarbons and especially olefines as organic-chemical raw materials. Raw materials are too expensive for general application, for instance, of the Fischer-Tropsch process, widely used before and during the war in Germany. Gasification of coal is still more expensive and more complicated than conversion of natural gas into synthesis gas.

However, the Chemische Werke Bergkamen A.G. in Westphalia has gone back to the Fischer-Tropsch process, improved since the war, with cobalt-thorium contact catalysts and using coke and water gas instead of cracking coke gas. Operating only since last year, the plant is turning out valuable aliphatic hydrocarbons, such as pure n-propyl alcohol. About half its output is gasoline motor fuel, and a quarter to a third, products, chiefly intended for processing into detergents and softeners. The urgency of turning out high-value compounds is apparent when you note that coke is 3.4 times, coke oven gas 3.2 times as expensive as before the war, while the finished product, gasoline—average octane ratings are now around 80—sells for only 1.6 times the prewar level. For the time being, the Fischer-Tropsch process is thus to be viewed primarily as a means of stretching petroleum and natural gas supplies. Further evidence of higher production costs is the fact that gasoline produced according to the Fischer-Tropsch or coal liquefaction process is taxed less heavily than that produced by other processes.

Acetylene, Too: These developments do not mean the Germans are counting out the well-known Reppe acetylene chemistry. Dr. Walter Reppe, heading the Badische Anilin laboratories at Ludwigshafen still sees a big future for it. During the war, it will be remembered, large-scale processing under high pressure was successfully carried out despite the explosion danger.

That the Germans are still very much interested in acetylene chemistry was further evidenced by the fact that the Dechema prize of 1952 of the Max Buchner Research Foundation was awarded to Dr. H. Sachse of the Zellstofffabrik Waldhof and Dr. E. Bartholome of Ludwigshafen for their work on acetylene production through the incomplete combustion of methane with oxygen and on acetylene burned problems. Considerable work is still under way, however, on acetylene by oxygen thermal processes (Ludwigshafen) or through thermal cracking of natural gas or waste hydrocarbons (Scholven, Gelsenberg, Huels).

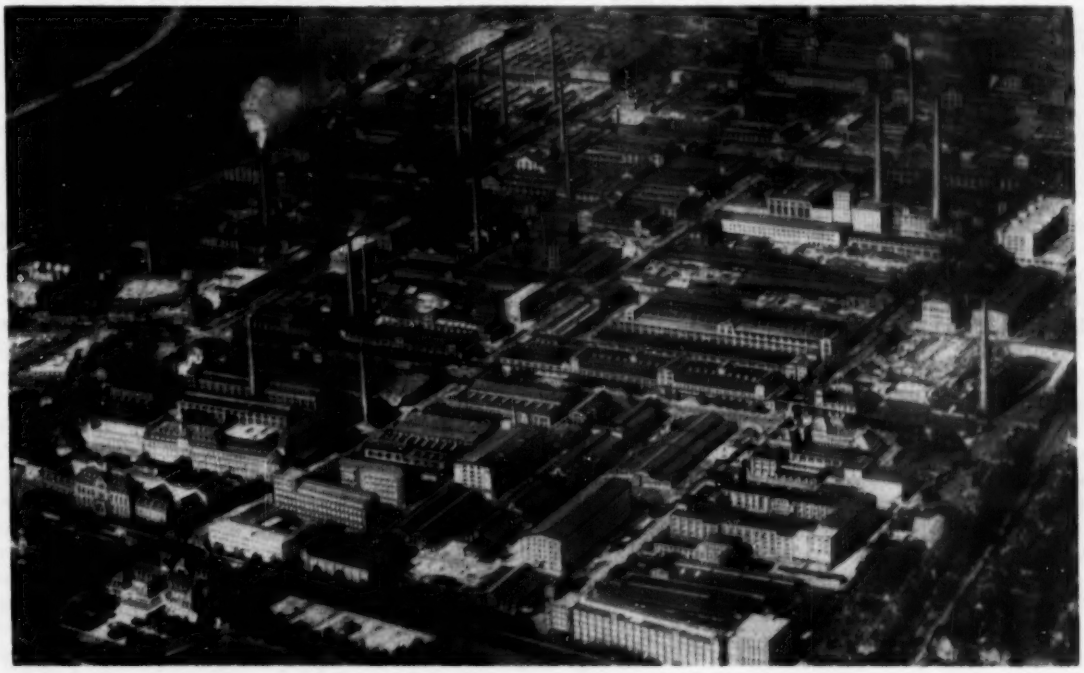
Advances in Aromatics

Scholven Chemie A.G. (before the war Hydrier-Werke Scholven) resumed high-pressure coal hydrogenation in 1952 after allied restrictions had been lifted. It has a capacity around 250,000 tons of gasoline per year, but it is keeping an eye on the chemicals produced from coal, which can be worth considerably more than synthetic fuels. That it is not staking its future entirely on coal can be seen from the fact that it plans also to process crude oil from the Emsland region in Germany and from the Near East. To facilitate transport, it, too, is building an oil pipeline to Duisburg-Ruhrort harbor. It plans ultimately to process 750,000 tons of crude oil per year.

Through an improved catalytic refining process developed with the Benzol Verband, Scholven has increased the yield and purity of benzene, which is widely used in Germany as an anti-knock component of gasoline instead of tetraethyl leads.* Partly because of this process, benzene will probably retain its importance in the immediate future as a motor fuel ingredient and important source of aromatics for the chemical industry—in spite of some attractive petrochemical processes.

Several coking companies are pro-

* Production of which was banned after the war



Bayer at Leverkusen

AUTHOR KARL FALK, after touring Germany and writing this report for *CW*, made a special trip to Bayer's plant at Leverkusen where he spent some time observing operations. His memo on his visit there contains some enlightening comparisons and contrasts with similar modern American plants. Here's what he says:

"The plant at Leverkusen, where 30,000 of Bayer's 40,000 employees work, is located on the Rhine near Cologne on a 500-acre site, picked out by Carl Duisberg in the 1890s. His layout, with wide streets and with production proceeding away from the Rhine, from raw material to intermediates to finished products, is still essentially followed today. Raw materials (total over 2 million tons/year) come in mainly by barge on the Rhine River side. A large part of the 1 million tons of products going out of the plant also leave by water.

"Generally, one sees fewer raw materials, intermediates and finished products as actual materials than in a comparable American plant. The Bayer company, which is the largest industrial enterprise in Germany (and the continent) and which was given the first permit by the British in their zone to resume production, believes in making practically all its own intermediates and buys little from the outside. Leverkusen also supplies intermediates and other materials to the remaining Bayer plants at Elberfeld, Uerdingen and Dormagen.

"About 20% of the Leverkusen plant was bombed out during the war; and the hydrazine hydrate, plastics, synthetic resin producing units as well as the synthetic rubber labs were largely removed as war reparations. But construction has more than made up for this loss of capacity. Newest buildings are laboratories, the expanded Agfa film units, the diisocyanate units, facilities for penicillin, acrylonitrile and caprolactam. Generally, the plant is working at capacity and trying to expand to stay ahead of orders.

"The gypsum unit for making sulfuric acid has now been almost entirely torn down as it was too expensive to operate. Older sulfuric acid units are being kept because their capacity is needed; they are already amortized and the available capital is more urgently needed for other expansion.

"Factory workers put in a 48-hour week, from 7 a.m. to 4 p.m.; the salaried workers from 8 to 5. Offices are open a half day on Saturday. Private buses take them to and from work (few employees have cars).

"Bayer—like the old I. G.—is long on social employee relations. It pays considerably more than the minimum legal requirements in pensions and fringe benefits.

"One thing that struck me about the plant is the almost complete lack of outward signs of a safety campaign. I am thinking of scoreboards showing safety records in American plants, and the posters that drive home the need for safety. There are plenty of potential 'booby traps' around the plant. Maybe the German workers are more cautious than their American counterparts. Also, they have to undergo a fairly long apprenticeship training, which includes safety training."

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ducing benzene, a portion of which is converted into phenol. One company is using the cumene process to convert benzene into phenol.

In the past, four-fifths of the Ruhr benzene production has been sent to Scholven Chemie for purification after pressure refining processes have taken place. The refined product has either been used as motor benzene or processed to industrial benzene through fractional distillation. Early in 1954, the BV Aral A.G. started building a centralized distillation plant at the site of its large tank storage facilities in Gelsenkirchen, to which four pipelines are to bring the raw material from production centers. The distillation plant, being built by Heinrich Koppers G.m.b.H. (Essen), ultimately to put through 400 to 500 tons/day of the pressure-refined product, is stated to be the first large distillation plant for pressure-refined benzene and the largest distillation plant for pure benzene in Europe. Later, a unit to produce toluene, xylenes and other aromatic solvents will be added. Scholven Chemie, 7 miles away, is building what is claimed to be the first benzene pipeline in the world. Chemische Werke Huels, a large user of pure benzene, is also building an additional 13-mile benzene pipeline to its plant in Marl. Benzene isn't too easy to transport by pipeline. (But acetylene isn't either, as Chemische Werke Huels discovered in an explosion in Jan. 1954 when acetylene and raw ethylene pipes burst, apparently because of cold weather.)

The Rheinpreussen A.G. fuer Bergbau and Chemie at Homberg in the lower Rhine area, is ready to go from pilot plant to full production of a new hydrocarbon synthesis. It will use iron catalysts in place of the more expensive cobalt-thorium catalysts (as used by Bergkamen in Westphalia). The process is claimed to be more economical, to give higher yields per cubic meter of synthesis gas, and to offer better control for chemical and motor fuel end products. Up to 90% of the product can be used as motor fuel or up to 80% as hard wax. Up to 80% can also be turned into intermediates for chemical processing, for example, of plastics, synthetic rubber, solvents for lacquers and resins, and detergents. The economy of the process is claimed to lie in the use of cheaper coal for gas production.

Rheinische Olefinwerke G.m.b.H., subsidiary of Badische Anilin and Shell A.G. (Hamburg), is planning a large-scale petrochemical plant to go into production this year. It will produce polyethylene and ethyl benzene from cracking gases, processing ethylene from a neighboring refinery at Wesseling near Cologne. When finished, it will be the first large-scale completely petrochemical plant in the Bundesrepublik.

Plastics and Fibers

In light metals, plastics and synthetic fibers, Germany, at the outbreak of the war, was about on a par, if not a little ahead of the U.S., technologically and in output. Magnesium production is still on the "verboten" list, and aluminum production is just getting under way again in West Germany. A considerable part of the prewar electrometallurgical facilities were located in what is now the Soviet zone, built up around the cheaper power sources based on lignite in central Germany.

In plastics and synthetic fibers, U.S. producers, through more intensive research and development work and by serving a larger and more varied market, piled up a considerable lead over the Germans during and after the war. West German plastics production today has recovered to the point where it furnishes roughly one-seventh of world output of about 2 million tons. In '53, West Germany provided one-fifth of total world exports of plastics, equivalent to about half of the U.S. share. However, German plastic production and exports are rapidly expanding and closing this gap. That considerable technical progress has been made was evident at the annual national plastics convention held in Stuttgart last October. Many U. S. processes in this field are being licensed to Germany, whereas such German processes as low-pressure polyethylene are going to the U.S. Monsanto-Bayer cooperation in the isocyanate field is an example. Widespread introduction of polyesters in combination with glass fibers in Germany, however, bogs down due to the fact that although the cost of polyesters produced in Germany is only one-fifth to one-quarter higher than in the U.S., the glass fiber cost is so much higher that the cost of the finished product is prohibitive.

In chemical fibers Americans before the war were interested more in rayon production and research on condensation fibers, while Germans worked on polymerization fibers based on cheaper raw materials. They were also significant producers of rayon staple fiber, which is relatively expensive except in large-scale production. I. G. Farben developed its first fully synthetic (PeCe) fiber in the 1930s. In 1938, almost simultaneously with the development of nylon in the U.S., the Germans completed a successful condensation polymerization of caprolactam that yielded "Perlon," the German equivalent of U.S. nylon—now Tynex. In 1942 the first commercially successful solvent for polyacrylonitrile was patented in Germany.

In the Lead: In the meantime, the U.S. has gone way out in front, now accounts for four-fifths of the world output of synthetic fibers, with Britain and West Germany lagging far behind. Chemical fiber production (including rayon filament and staple) now accounts for one-tenth the value of West Germany's chemical output. Its share will probably increase in the near future if for no other reason than that synthetic fibers account for 34% of the total fiber consumption (as contrasted with 19% in the U.S.). Its per capita consumption of both natural and synthetic, however, is only one-third that of the U.S.

Currently there are four plants in Germany making nylon and Perlon. Bayer is now marketing a Perlon fiber completely dyed during the spinning process. Recently, presumably because output the past year had doubled, German prices were cut 20-30% to bring them into line with world prices. Germans claim they could lower prices another 30% if facilities could be consolidated. But in the recent past, consolidation would not meet with Allied approval.

Terylene is licensed through British I.C.I. to Hoechst and Vereinigte Glanzstoff-Fabriken in Germany. An acrylic

I.G. SUCCESSORS: WHERE THEY STAND TODAY

Company	Main Plant Locations	Principal Products	Capital Stock (in mil. $)	1953 sales (mil. $)	Percent of Sales Exported	Number of Employees
Farbenfabriken Bayer A. G. ("Bayer")	Leverkusen, Elberfeld, Uerdingen, Dormagen	Basic organic and inorganic chemicals; organic intermediates; dyes; pharmaceuticals; agricultural chemicals; synthetic fibers; photographic chemicals	92	244	34%	40,000
Badische Anilin- & Soda-Fabrik A.G. ("BASF" or "Badische")	Ludwigshafen	Plastic raw materials; fertilizers and agricultural chemicals; dye-stuffs; tanning and textile agents	81	210	33%	28,000
Farbwerke Hoechst A.G. ("Hoechst")	Frankfurt-Hoechst, Griesheim, Gersthofen, Offenbach, Bobingen, Marburg	Basic chemicals; dyes and intermediates; pharmaceuticals; fertilizers; textiles	68	224	35%	28,500
Cassella Farbwerke Mainkur A.G. ("Cassella")	Frankfurt-Mainkur	Dyes, synthetic fibers; plastics; pharmaceuticals	8	13	50%	2,000
Chemische Werke Huels G.m.b.H. ("Huels")	Huels-Marl	Solvents; detergents; plastic intermediates; synthetic rubber	21 I.G., 29 total	75	34%	10,000

fiber resembling Du Pont Orlon 42 is produced by Bayer from acrylonitrile made by the firm's own process employing hydrocyanic acid and acetylene. Bayer is the largest chemical fiber producer of the I.G. successor companies and is the third largest chemical fiber producer in the Bundesrepublik. Hoechst, however, furnishes half of western Germany's synthetic fiber output. Four plants produce acrylic fiber under different tradenames (Pan, Redom, Dolan) in West Germany.

Question of Cartels

The future of the "decartelized" I. G. Farben successors is the big question of the German chemical industry.

In 1953, when the former I.G. was returned to the Germans after eight years of Allied control, it was split into five successor companies instead of into 12 as had been originally planned. At the end of the war, 36% of I.G. assets lay in West Germany, 38% in East Germany, and the remaining 26% represented foreign holdings and claims on the government of the German Reich.

Some figures may help to give an idea of the extent and complexity of the former I. G. Farben concern. It owned 40,000 patents, employed 189,000 persons (1944), and its peak sales were 3 billion RM* (1942), which was exceeded in '53 by the Big Three (Bayer, BASF, Hoechst) for the first time. About 400 German firms had belonged to the concern, which also had an interest—in one form or another—in some 500 foreign firms. In 1938 I.G. supplied 25% of the Reich's chemical output of 6.5 billion RM and 57.5% of the Reich's chemical exports. I.G., in 1938, represented not quite 5% of all German invested industrial capital, but 45% of capital invested in the chemical industry.

The chief reminders of this chemical colossus are the present Big Three West German chemical producers.

In 1953, the Big Three successor firms furnished 28% of the Bundesrepublik's chemical production of $2.5 billion and 40% of West German chemical exports. By way of comparison, Du Pont sales in 1953 would have been just under the equivalent of three-quarters the total chemical sales of the entire Bundesrepublik and nearly two and one-half times the Big Three's sales. Union Carbide and the British I.C.I. would also have nosed out the combined Big Three.

Barometer of Success: Abroad, the remarkable recovery of the West German chemical industry, and especially of its Big Three, is viewed as

* Equivalent to $714 million. Because of the currency reform instituted in 1948, however, it's virtually impossible to give a meaningful comparison between the R-Mark and the U.S. dollar.

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proof that despite the division of I.G. Farben the new companies are economically healthy, able to compete abroad, and are capable of raising sufficient capital for facilities and research. This view is not shared by many of the German chemical leaders, who point to the difficulties of raising sufficient capital to expand basic chemical capacity, of maintaining separate and often duplicating facilities, of maintaining more expensive smaller production units, and of organizing separate sales organizations at home and abroad. In short, they point to all the advantages of production, research, development and marketing that went with the former large-scale integration. This view is not unanimous, however, since there are also some Germans who oppose reintegration by pointing to the administrative top-heaviness and organizational complexity of the old I.G., to the incompatibility of restrictive cartel arrangements with a liberalized economy, and to the unpopularity in certain circles and dangers of cartels in general.

A middle-of-the-road view between those who favor complete reintegration—which can't be considered before the beginning of 1956, at least for the Big Three, according to the Adenauer-McCloy agreement—and those who favor going along as completely independent competitive companies are those who feel some other kind of cooperation than formal integration will be necessary to achieve more efficient distribution of limited capital, research, and marketing facilities. West Germany is too small, they say, to be able to afford higher-cost production of certain chemicals in scattered smaller plants. Each successor firm has had to round out its basic chemical and finished product line. One plant of the old I.G., for instance, may have specialized in one type of dyes, and another in others. Now both have to furnish an almost complete line in order to hold their customers. Also adding to the burden of the new companies is the need for caring for 30,000 pensioned workers of the old I.G. Farben, which voluntarily paid far above the legal requirements to its employees in bonuses and pensions.

Here's how the Big Three shape up today for tomorrow's world chemical struggle:

• Badische Anilin at Ludwigshafen probably has the best-rounded production and research program of the successor firms and could probably get along easiest as an "independent." The plant at Ludwigshafen, at which practically all the BASF production is concentrated, is the largest single chemical factory of West Germany and of Europe. It has recovered almost completely from the effects of the extensive destruction and dismantling, and capacity now exceeds that of 1938. In the split-up, BASF took over primarily those I.G. patents in which it had done the principal research and development. Former I.G. trademarks (except "Indanthren" and Perlon, now used jointly) were likewise assigned to the successor firm using them most. About half of BASF's sales in '53 were chemicals, including starting materials for plastics. About one-fourth were dyestuffs; another quarter, textile chemicals; and a similar amount, fertilizers and agricultural chemicals. Its main research emphasis is on the synthesis of new organic products, especially synthetic raw materials, intermediates for synthetic fibers, improvement of dyestuffs, and development of complete fertilizers (that include trace elements), and plant protective chemicals. Through the joint venture with Shell at Wesseling near Cologne by this year it will be getting full-scale into the petrochemical field.

• Bayer at Leverkusen, with additional plants in other parts of West Germany, has the largest capitalization of any postwar chemical firm and is the largest industrial enterprise of West Germany. Before the war it was best known abroad for its pharmaceuticals. Bayer has spent well over $100 million on new plants and expansion since the currency reform of 1948, which marked the turning point for German chemical production and research after the war. The former Agfa film production of Wolfen in the Eastern zone has been taken over at Leverkusen, where new facilities had to be built for it. Several new research laboratories are being built as well as plants to produce plastic and synthetic fiber raw materials and intermediates. Those plants not suffering war damage, such as Bayer's Elberfeld plant (pharmaceuticals and agricultural chemicals) still had to be rebuilt to a considerable extent simply to make them more economical producing units. Considerable expansion is also needed to overcome the inadequate capacity for inorganic basic chemicals and organic intermediates. After long research and development work Bayer is producing about 2000 tons/month of polyisocyanate products for plastics. Bayer is also a large factor in synthetic fibers and agricultural chemicals. In '53, Bayer exported about half its dyestuff production, nearly two-fifths of its pharmaceuticals, and one-fifth of its chemical fibers.

• Hoechst, in order to carry on research more adequately, built four new laboratories in '53. Its current interest centers on research and development of plastics, synthetic fibers, petrochemicals, and pharmaceuticals in addition to its older interest in dyes and agricultural chemicals. Since capacity limits have also been reached in basic chemicals such as sulfuric acid, chlorine, and caustic soda, a plant expansion program of $25 million was planned for '54 to increase production of these basic chemicals as well as synthetic fibers. It is also expanding its electrochemical facilities especially at Knapsack where phosphorus production was recently begun.

Over 50% of Hoechst's dyestuffs were exported in '53 besides 30% of its fertilizers and agricultural chemicals. Hoechst is adding a new unit to turn out penicillin, of which it is already the largest producer in the Bundesrepublik. It also accounts for almost half the West German synthetic fiber production and is the largest German producer of vinyl acetate and its polymerization products.

Organizing for Sales: Each of the Big Three has a different approach to organizing its sales abroad. The lack of established foreign trade organizations and loss of "Iron Curtain" markets has handicapped postwar exports, which are nevertheless climbing rapidly, partly because of granting favorable credit terms to foreign buyers. Each of the three exports over a third of its output. Before the war, Bayer exported half its production. Because of tariff and other import restrictions,

Bayer generally favors setting up plants to do further processing within other countries. In '53, for instance, it bought into the Brazilian Alianca Comercial de Anilinas S.A. of Rio de Janeiro. It is forming a joint German-Argentinian firm (Bayer 45%, Argentine interests, 55%), Fabricas Argentinas de Anilina S.A., and has received rather interesting concessions to be able to transfer its capital back after 10 years. It has teamed up with Monsanto to form Mobay, whose plant in West Virginia will produce polyesters and isocyanates.

Bayer claims its exports have been made more difficult since its trademarks and patents in the field of phosphoric acid esters were lost because of the war and because they are now being produced in other countries. Nevertheless its sales and exports in this field increased in '53 by 50% over the previous year.

Badische favors using native firms to carry on its sales and supporting them by sending German technical experts when needed. BASF's exports are about equally divided between Europe and overseas. Hoechst, on the other hand, maintains its own representatives in some countries and works in others through affiliated or allied firms. In France, it recently formed a joint subsidiary with the Soc. Industrielle pour la Fabrication des Antibiotiques, called Union Chimiques Continentale, to produce pharmaceuticals according to Hoechst processes. The importance of West Germany in this field is evidenced by the fact that one-tenth the value of all its chemical production in 1953 was of pharmaceutical specialties.

The New Attitude

Under Economic Minister Ludwig Erhard, West German industry has an attitude that's entirely different from that before the war. It realizes that it stands to gain most from a liberalized economy both at home and abroad. A postwar visitor is struck by the abundance of foreign goods in German shops, a rare sight in the '30s.

For the chemical observer, this new attitude is forcefully reflected by the trade publications and journals. Although they're still not as revealing of trade and company information as are their U.S. counterparts, they're a lot more frank and forthright than they were before the war.

Most of these papers are back on their feet again after the disruptions connected with the breakdown at the end of the war. *Chemie-Ingenieur-Technik* has taken the place of the former applied chemistry section of *Angewandte Chemie*. *Chemische Industrie*, the *Chemiker Zeitung* and *Kunststoffe* are also being published, as are abstracting services and a growing number of chemical encyclopedia publications.

There's also more evidence now of cooperation on an international scale. The various associations (like the Verband der Chemischen Industrie, which recently celebrated its 75th anniversary) are active. And last September and October a number of German chemical leaders were guests in America.

Cooperation with other European associations and discussions of the mutual problems dealing with West European integration and specialization have made some real headway. The Dechema (Deutsche Gesellschaft fuer Chemisches Apparatewesen) and Achema (Ausstellung Chemischer Apparate) organizations are also active. After staging exhibits in 1950 and 1952, they are preparing for another international meeting and exhibit in Frankfurt this year (May 14-22) which, they hope, will draw a sizable attendance from America.

Dechema and the V.D.I. (Verein Deutscher Ingenieure, "Verfahrenstechnik") committee are also interested in the problem of chemical education, a subject that's being vigorously debated in West Germany. Much of the discussion centers around "depth" vs "breadth" and U.S. training is being compared with German.

Between 9000 and 10,000 students, mostly male (women fare worse in this field than in the U.S.), are now studying chemistry at German universities and institutes of technology. And they're studying under 250 professors. Both student and teacher figures are considered to be low.

The shortage of trained chemists and "chemical engineers," however, is not quite as acute as it was a few years ago. For, whereas in the immediate postwar period, many German chemists tried to head for the United States, many of the older ones who emigrated before the war are now starting to return to Germany.

Although technical libraries and research facilities are still inadequate for the most part, they are outstanding and making big contributions in some specialized fields.

New Products: And the results of the new attitude are clearly evidenced by the number of new products now being turned out. At the Hannover Technical Fair (which has taken the place of the Leipzig Fair for West Germany), for instance, an impressive array of new plastics, fibers and new complete fertilizers were displayed.

One new development is a combined fertilizer and soil conditioner ammonium humate, in which the ammonia is bound to humic acid obtained through the oxidation of peat, lignite and coal. Among other new products shown: Agfa sound film on polyvinyl chloride (instead of acetyl cellulose) film; silicones (by Bayer, Th. Goldschmidt and Wacker-Chemie); a new type of Plexiglas (Bascodur) by Rohm & Haas, as a lining for chemical apparatus made by F. Raschig.

Balancing Up: A balance sheet of the West German chemical industry then would read something like this:

It has recovered from wartime destruction and postwar dismantling—a long-range asset in that modernized capacity had to be installed. It has lost its lead in research on light metals, plastics and fibers but it is catching up fast in the latter two categories in which it has a bright future.

Coal chemistry and acetylene chemistry—though expensive at the moment—will have to remain the backbone of the German chemical industry. The country is, however, making a slow start in petrochemicals. Though it will have to settle for a position considerably less prominent than what it enjoyed before the war, there's plenty of room for the German chemical industry.

In the final analysis, the future success of the German industry—with or without corporate reintegration or reorganization—will depend largely on its adaptability; its ability to design new processes and to lower costs of raw materials; to capitalize on know-how and lower labor costs; to develop greater specializations; to acquire more capital and to develop a sound export trade in markets free of excessive restrictions. And that's critically dependent on future economic and political stability in West Germany and in the Western world in general.

POWDER BLEACHES—A RAW MATERIALS RUNDOWN

	In Currently Available Dry Bleaches			Potentially for Powder Bleaches
	Sodium Perborate (Light duty bleach)	**Calcium Hypochlorite**	**Dichlorodimethyl-hydantoin (Halane)**	**Trichloro-cyanuric acid**
Some Leading Suppliers	Becco Chemical Div.; Du Pont	Columbia-Southern; Olin-Mathieson; Pennsalt; Wyandotte	Wyandotte	Monsanto
Physical State	White powder	White powder	White powder	White crystal
Odor	Odorless	Moderate chlorine	Moderate chlorine	Moderate chlorine
Can Be Spray-dried?	Yes	Yes	Yes	Still testing
Container Material (household products)	Cardboard	Glass	Cardboard	Still testing
Average Raw Material Cost/lb. (drums)	19¢	28¢	60¢	Experimental quantities only

Laundry Bleaches: Bottles to Boxes

This week finds two of the "Big Three" soapers with a toe hold in the dry bleach field. Colgate is test-marketing Pruf (it's their second effort) in two areas, while Procter & Gamble is selling Stardust less openly in a small number of outlets. Both of the products are based on a relatively new bleach compound, dichlorodimethylhydantoin (tradenamed Halane) (*CW, Nov. 21, '53, p. 81*).

Enthusisasts – who see nonliquid bleaches eventually grabbing 40% of all bleach sales–regard such entries as evidence that powder types are set for a big-scale push. If that's true, it could mean a sharp blow for the small specialty firms that make and sell their own liquid bleaches in limited areas. But the picture isn't clear yet; until it is, both detergent makers and bleach makers will keep phones ringing to find out who's doing what. Here's why:

Triple Choice: Until recently, the housewife could buy just one bleach, liquid sodium hypochlorite. Now she has a choice of three powder types:

- Calcium hypochlorite. It's the only powdered chlorine bleach currently sold in volume. Based on it is Purex Dry Bleach, made by Purex Corp. (Southgate, Calif.). Blended with a detergent, it sells for 33¢, comes in a glass jar. It hit the market in July '53.
- Sodium perborate. Sage Labs (New York) unwrapped this powder with its Sage Safety Bleach in the spring of 1951. A few of the current competitors: Dexol (Perfex Mfg. Co., Omaha), Du Pont All Fabric, Snowy Bleach (Gold Seal Co., Bismarck, N.D.), Vano (Vano Products, Oakland, Calif.). They sell for around 29¢/12-oz. box.

Of the total powder bleach sales,* perborates make up the greater part. The adjective "safety" is usually applied to them, because although chlorine types (both liquid and powder) are not advised for silk, wool or rayon, perborates can be used on these fabrics.

- Halane. A joint venture of Glyco Products Co. (Brooklyn) and Wyandotte, it first appeared in Nov. '53 in Sage's Dry Bleach–price 33¢. In the spring of last year Colgate began test-marketing its brand–Pruf–in Orlando, Fla., and Green Bay, Wis.

* One estimate is that bleach sales in grocery stores in 1953 came to $45 million for liquids, $6.25 million for powders. This was a 15% increase in powder sales over 1952. A similar growth is believed to have occurred last year.

Not long after Pruf's introduction, the roof fell in—the Halane was found to be breaking down in the cardboard package, liberating chlorine. Quickly newspaper ads were run offering refunds to any housewife not pleased with Pruf. This fast move was excellent from a consumer relations standpoint, but it decreased the value of the trial-market program.

Just two months ago, Colgate launched a second campaign. The improved product is now being sold in Williamsport, Pa., and Lake Charles, La. Asked by *CW* last week about Pruf's prospects, Colgate called it "the hottest thing around," said it hadn't decided when Pruf will go national.

Not in commercially available bleaches at this time is another powder compound that's touted to have properties ideal for bleaches. It's trichlorocyanuric acid, and it's currently offered to bleach manufacturers by Monsanto (*see chart*).

Caution in Cincinnati: P&G may not be far behind Colgate, though it's actively playing down its interest in dry bleaches. A spokesman claims no plans are being drawn up to market its Stardust. Sales have only been "in a half dozen or so stores."

(The other member of the soap triumvirate, Lever, tells *CW* it has no dry bleach entry, plans none.)

Now, while most eyes are on Colgate and P&G, it's necessary to look elsewhere for an understanding of what's happening. Though convinced dry bleaches are here to stay, Purex says it will take a lot of educating before housewives will switch to powders in large numbers.

But chances are that more than education is needed. Explanation: all three types of powders possess certain disadvantages. Calcium hypochlorite, for instance, shares a shortcoming of sodium hypochlorite—if a housewife doesn't follow directions closely, she might end up damaging the fabric.

Purex is not blind to this. It admonishes users to "Read directions on the label," "Never add bleach in dry state after clothes are in washer." While not planning any "substantial" product change, the company nevertheless admits merchandising other dry formulations in various test markets. It says one is a Halane type.

With perborates and Halane-based

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Color Conscious Customers?

Color significantly influences the point-of-sales acceptance of a wide variety of products. Indeed, many products—paints, cosmetics, rugs, clothing, etc.—depend upon color almost entirely for their sales appeal.

To manufacturers of these products, the precise shade or hue becomes vitally important. Visual color determination is unreliable, even under the ideal conditions. Imperfect color matching results in production delays, customer dissatisfaction —and loss of profits.

Precise Color Data

Reflectance measurement with spectrophotometers has provided industry with a precision tool in making color tests. Light at selected wavelengths is projected onto the solid or opaque-liquid sample; the reflected light is measured electronically in comparison with the reflectance from a white standard; and a graphic record is plotted. But even utilizing instrumental methods, detailed plotting of curves might take up to four hours.

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Color-conscious processors can now pin-point any color in as little as 10, and in no more than 30, minutes. And the records are charted on standard file-size graph paper.

Suede leather, synthetic fiber threads, rayon tricot, rugs, paints (both liquid and dry), and cosmetic powders in loose and cake form have yielded their color secrets to the automatic recording spectrophotometer.

To learn more about spectrophotometers and color evaluation write for data file CW-1.

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bleaches, the housewife doesn't run the risk of damage from overuse. Still, they —and calcium hypochlorite—have one big drawback: cup for cup, they aren't as effective as the liquid stand-bys.

Another argument against perborates is that they are intended mainly for use on fine fabrics. "They just can't take the place of the good, old, honest-to-goodness liquid bleaches," competitors say.

Despite such criticisms, perborates bear watching. Though hush-hush on Stardust, P&G concedes it's test-marketing a new version of Oxydol, which contains 5-10% sodium perborate. Though the idea is not new—one time Duz contained perborate—it's an abrupt change from the "no bleach" advertising that prevailed a few years ago. In addition, perborates are now standard fare in at least two scouring powders, Bab-O and New Old Dutch Cleanser.

Advertising Approach: As for Halane, though researchers feel it could be more effective, Colgate's promotion includes the usual claims that Pruf "Gets clothes whiter," "Removes stains easier," and sanitizes and deodorizes "longer than any other bleach —liquid or powder." Furthermore, Pruf is claimed to overcome major disadvantages of liquid types, thus eliminating "yellowing of white fabrics," corrosion of washing machines, "harsh splattering liquid" that damages and discolors clothing, "burned hands," "heavy bottles."

Of all the selling points, the anti-bottle one may be the most rewarding. Pruf—also Sage Dry Bleach, but not Stardust—is spray-dried, comes in a cardboard box that's lighter, less easily broken than a bottle.

Because of the convenience angle, Colgate and P&G could very well break up the present established pattern of

Acrylics and Antiques

AN ACRYLIC coating for Nigerian pottery—that's the new preservative system being tried at the Philadelphia Commercial Museum. Joyce Zeldow, of the museum's magazine staff, shows how it's done using an aerosol acrylic spray made by Krylon, Inc. (Philadelphia).

The clear, quick-drying plastic is claimed to protect surfaces from moisture, rot, fungus and rust. It's in use, or being tried, as the final preservative in the Eisenhower Museum (Abiline, Kan.), on 1000-year-old Viking ships in Norway, and on the recently discovered 4700-year-old wooden solar ships of Egypt's Pharaoh Cheops.

The Oronite manufacturing process permits the consistent marketing of a highly pure Phenol. Exceeding the U. S. P. congealing point specification of 39.0° C, Oronite's guaranteed minimum is 40.6° C—with actual shipments being regularly higher. This dependable high quality, at competitive prices, suggests Oronite as a leading Phenol source.

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Detergent D-60	Lubricating Oil	Naphthenic Acids	Aliphatic Acid
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liquid sodium hypochlorite distribution. Probably Clorox is the only liquid chlorine that's truly national. Usually these products are local, often dominating an area of no more than 100 miles radius. That's due chiefly to the shipping expense that goes with handling liquid types.

What bleach and detergent makers seek to learn now about the heavy-duty dry bleaches is whether the advantage of convenience can out-balance a disadvantage of cost. For a powder type now costs about 5¢/wash, against a 3½¢/wash cost with a liquid. In many fields of chemical specialties, convenience has been the factor determining success and it looks as if the big soapers are betting on it to win consumers' favor for dry bleach.

Hefty Coat

Combining pulverized aluminum with a vinyl resin vehicle, Woodhill Chemical Co. (Cleveland) has developed an extra-heavy coating for everything from steel to concrete and wood.

Duro Aluminum Shell coating, as it's been tagged, can be brush- or spray-applied to give an 8-10 mil. coat in one application—that's nearly three times the thickness of conventional aluminum flake finishes. Skinning over in about an hour, Duro hardens completely in six hours, can then be filed or buffed or burnished.

A full gallon of the new material weighs nearly 13 lbs. (sells for $12). That's enough to cover approximately 250 sq. ft., depending on surface porosity (Duro can be thinned with ketones). Because it gives a triple-thick coat, Woodhill says Duro is cheaper to use than a flake finish, which is initially cheaper (averaging $8/gal.) and covers considerably more area (perhaps 425 sq. ft.).

Woodhill, long-time maker of auto body solders, has test evidence to show that its new coating gives effective protection from —40 F to 600 F. Also, it has good resistance to crude oil, gasoline, marine and fresh water. Currently marketing Duro only to industrial users, Woodhill sees it principally used as protection for wooden and steel structural members, and as a waterproof sealer and smoother for concrete.

•

Glue Boost: A strongly favorable report on the use of epoxide resins in place of soft solder for certain metal-to-metal bonds is contained in a recent Army Research report. Specifically listing Araldite 115 as a substitute for solder in bonding steel screens to cold-rolled steel shrouds in bomb tail-fin manufacture, it also suggests three other adhesives, Araldite 111, Epon formulation, and Cordo Bond No. 80, for some similar applications. Full report is Order PB 111445, Investigation of Adhesives: Metal-to-Metal Bonding. Army Chemical Center, Maryland. It's available (for 50¢) from OTS, U. S. Dept. of Commerce, Washington 25, D.C.

•

Slipproof Coating: A new liquid product, Nev-Er-Slip, makes bathtubs and shower stalls nonskid, according to the maker, Nail-Do Corp. (New York). A few drops on a dry surface forms a coat over the entire area, once the water is turned on.

•

Chill Proof: An automobile antifreeze composition has been patented by Gulf Research & Development Co. (U.S. Pat. 2,692,860). It is essentially ethylene glycol, with about 0.5% by weight sodium nitrite, 1.0% cyclohexylamine, and 0.2% of a 50% aqueous solution of sodium mercaptobenzothiazole.

•

Bacteriocidal Scrub: A soap with a synergized antiseptic composition has been developed by Monsanto's Eugene Elliott (U.S. Pat. 2,695,881). The antiseptic is described as a halogenated hydroxy quinoline, and the synergist as a tetra-alkyl thiuram disulfide.

•

Calcium Plus: With the granting of U.S. Pat. 2,696,453, Ninol Labs (Chicago) has revealed the secret behind its Toximul agricultural emulsifiers. The Toximuls, introduced about a year ago, are blends of nonionic surface-active agents with calcium alkylaryl sulfonate.

The new blends are claimed to give faster dispersion, work in smaller quantities, and produce better emulsions than plain nonionic emulsifiers, or than combinations with sodium alkylaryls, or amine-type anionics.

•

Squeeze Label: Flexible labels for polyethylene containers (or those made of other flexible materials) have been worked out by Fleetwood Press, Inc. (New York). The labels are designed to "give" with the container, and can be applied by conventional methods.

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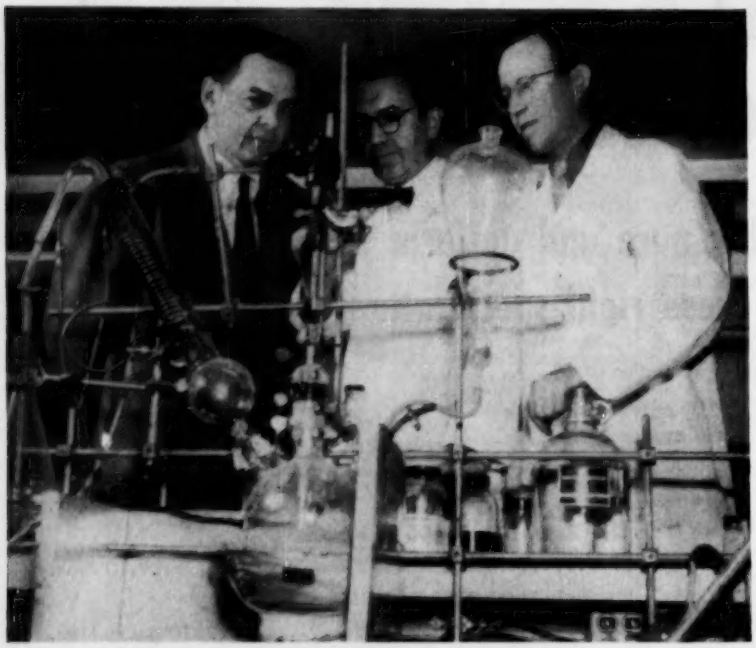

STEPAN AND SMEDSLUND* (left and center): To fill a big order, they're . . .

Banking on Solvency

It's a rare chemical manufacturer who doesn't get all fired up about introducing a new product. Not many, however, have matched the enthusiasm that Stepan Chemical Co. is displaying for dimethyl sulfoxide. In the last stages of pilot-planting DMSO, the Chicago firm this week was talking in terms of a 10-million-lbs./year plant for the chemical.

That, of course, will depend upon the final results of a market survey that Stepan is conducting.

Meanwhile, DMSO is giving the market researchers a brisk run for their money.

A high boiling (B.P. 189 C), water-white, nearly odorless liquid, the compound appears to be a potentially serious contender for several volume applications. Among these: antifreeze, paint remover, reaction medium, solvent for welding gas and synthetic fibers, selective solvent for petrochemical and fatty acid purification.

That's a pretty big order for a new chemical, but, as far as Stepan is concerned, DMSO is equipped to handle it. Miscible with water, it has a specific heat of 0.7 cal./g.—higher than that of most organics. Water solutions of the compound, moreover, possess lower freezing points than do corresponding ethylene glycol solutions.

Put those facts together and they spell antifreeze. By way of an added inducement, Stepan points out that DMSO's specific gravity is the same as ethylene glycol's—which means that filling station attendants could use their hydrometers on antifreeze solutions of the new product. The need for another hydrometer was one reason propylene glycol never made the grade as an antifreeze. DMSO is said to be about as corrosive as ethylene glycol but it, too, can be inhibited.

Soluble and Compatible: Water solubility, coupled with the ability to dissolve a broad range of organics, suggests the material for use as a paint remover, wire stripper, resin solvent, etc. A strong advantage in this connection is DMSO's compatibility with other solvents such as ethanol, acetone, ether, benzene and chloroform.

Stepan reports that DMSO will dissolve Orlon as effectively as dimethyl formamide, states further that it may be used as a solvent for dyes. Vinyl- and ester-type polymerizations provide other opportunities for the compound's solvency.

Many gases are generously soluble in DMSO. A potential medium for acetylene, it holds 33% more of the gas than does acetone. Consequently, welding gas cylinders charged with DMSO solutions of acetylene, would have a longer service life, save money on freight charges. Another possibility: DMSO might be a good selective solvent for the recovery of acetylene from pyrolized natural gas mixtures.

Aside from acetylene, such gases as ethylene oxide, sulfur dioxide, hydrogen chloride and nitrogen dioxide are all taken up in substantial proportions by DMSO.

Moreover, as a selective solvent, it has a high capacity for aromatics, sulfur-containing compounds and unsaturated hydrocarbons, but small affinity for paraffins. This combination qualifies the compound for a role in lube oil refining, diesel fuel upgrading, hydrocarbon separations, solvent extraction of fatty acids, deodorization (by removal of sulfur compounds) of a number of materials.

Possibilities in synthesis are comparatively few. DMSO is easily oxidized to dimethyl sulfone or reduced to dimethyl sulfide. Double compounds are formed by reacting the chemical with strong acids.

Toxicity thus far does not appear to be a problem. Preliminary animal studies reveal no sensitivity reactions or harmful effects on lung tissue. Toxicological evaluation is continuing, however, and the final word on this subject is yet to come.

Cost will be the most important factor in DMSO's commercial future. At a 10-million-lbs./year output level, the product will go for about 25¢/lb. That's not high, but it does leave something to be desired in the solvent business. If production gets into the 100-million-lbs./year class, cost might fall to 10-15¢/lb., the range of acetone and ethylene glycol. This isn't going to happen overnight, if it happens at all.

Hot Combination: DMSO is made by passing hot methanol and hydrogen sulfide over a catalyst to form dimethyl sulfide, which is condensed and purified by distillation. Methanol and hydrogen sulfide are recovered and re-

* And Stepan chemist Douglas Nelson.

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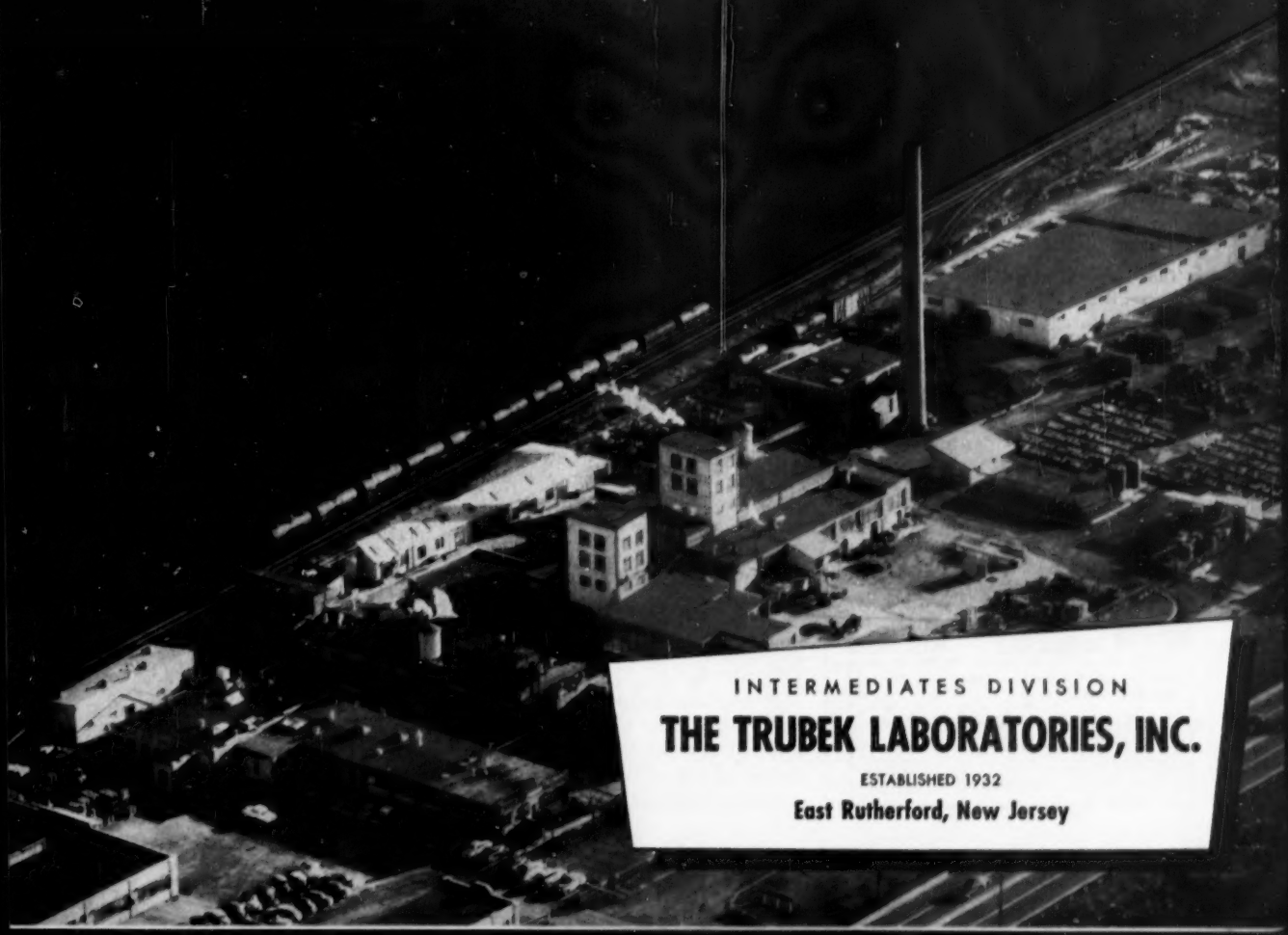

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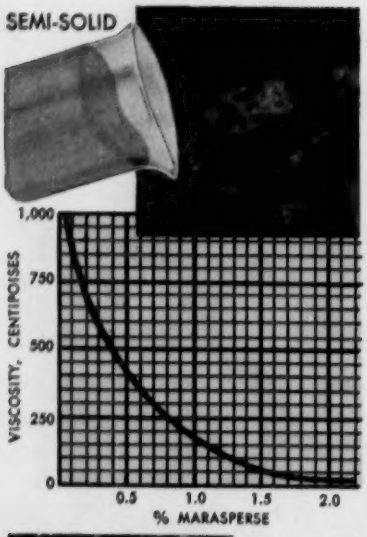

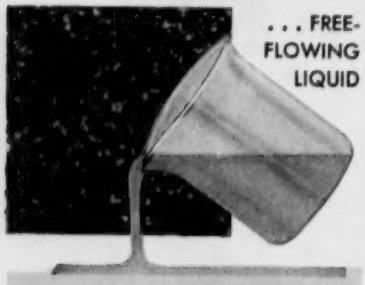

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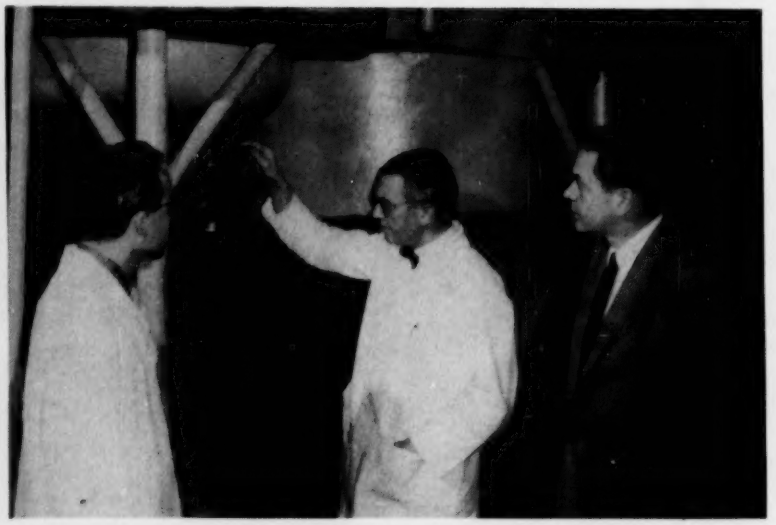

DMSO PILOT PLANT: Going the petrochemical route.

cycled. By-product methyl mercaptan may find outside uses (e.g., in methionine manufacture).

Purified dimethyl sulfide is mixed with air and nitrogen dioxide at atmospheric pressure to form dimethyl sulfoxide in a series of reaction chambers. As DMSO forms it condenses and runs down the reactor walls for collection. Nitrogen dioxide is driven off the raw product and recycled; nitrogen is vented into the atmosphere.

Small quantities of methanesulfonic acid are removed by treatment with lime and a 99.9%-pure product is obtained by vacuum distillation.

Dimethyl sulfide for DMSO might come from the sulfate pulp industry, but the petrochemical route (from methanol and hydrogen sulfide) is far more likely—especially if demand approaches Stepan's expectations.

Ironically, the chemical owes its new found prominence to pulping. Back in 1943, chemist Tor Smedslund of Centrallaboratorium A.B., the main laboratory of the Finnish paper industry, started an investigation of potentially remunerative uses for dimethyl sulfide—a by-product of sulfate pulping. Derivative dimethyl sulfoxide looked promising and an economical synthesis – air-oxidation of the sulfide in the presence of nitrogen oxides—was developed.

Stepan Chemical got wind of Smedslund's work some time later, became involved in a lengthy correspondence on the subject of DMSO. Ultimately, company President Alfred Stepan, Jr., went to Helsinki* to see for himself, negotiate for U.S. rights to the new material. As a result of these discussions, Stepan has been licensed under U.S. patents 2,581,050 and 2,539,871. Subsequently, Smedslund was brought to this country to help develop the manufacturing process.

Today, more than a decade after he launched his studies, Smedslund is just beginning to glimpse the commercial rewards of his labors. Whether they will gratify his and the company's expectations remains to be seen.

'Kilobuck' Problem

There's no question today that industry has a heavy stake in the continuing welfare of basic research. That's why the threat of government domination of university science is a problem for industry. A thought-provoking approach to a solution was supplied last fortnight by a man who speaks from experience. He's Paul Klopsteg of the National Science Foundation.

His sounding board: the year-end meeting of the American Assn. for the Advancement of Science's industrial science section.

Held in Berkeley's (Calif.) Hotel Claremont, the gathering reflected industry's increasing awareness of the importance of basic research (*CW Newsletter, Jan. 8*). NSF's Klopsteg, University of California's Kenneth Pitzer and Shell Oil's Monroe Spaght

* In time to see his swimmer daughter in the 1952 Olympics.

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held forth on the respective roles of government, universities and industry in basic research.

Later, listeners were briefed on basic research in Europe and neglected areas of basic research.

But it was Klopsteg who came to grips with the problem that is furrowing the brows of thoughtful researchers in all quarters. Pointing out that the trend since World War II is in the direction of constantly increasing government subsidy of basic research, he cautioned: "To travel this road without limit must be questioned on at least two grounds."

The consequences, according to Klopsteg, are likely to be deterioration in the quality of such "easy money" research; and increasing government control of institutions of learning.

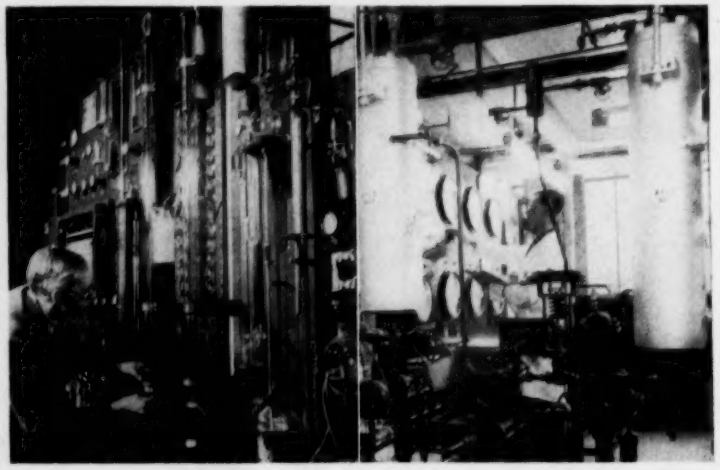
The alternative: broaden the base of financial support of basic research. Both industry and the private individual should be encouraged to give more. The former, he maintains, is becoming increasingly aware* that economic progress depends on the output of our colleges and universities; private citizens need more incentive.

The government, Klopsteg suggests, could use its powers of taxation to put both groups in a more generous frame of mind. His plan, briefly, is to make contributions less costly for the millions of taxpayers in the lower surtax brackets. A man in the maximum (89%) bracket is spared $890 in tax for every $1000 he donates; the cost to him is $110. But the cost to a 25% taxpayer would be $750.

To correct this situation, Klopsteg would revise the income tax laws. He suggests three possibilities: (1) permit the taxpayer to make deductions not from taxable income, but from the computed tax; (2) add a new 100% surtax bracket, which would reduce the cost of giving to zero; (3) continue the present procedure, but allow the taxpayer to deduct a multiple of his donation.

Through all of this, however, Klopsteg never advocates government withdrawal from the support of fundamental investigations. At a time when the cost of team research is measured in "kilobucks" it is virtually impossible for any one institution to finance some of the more ambitious undertakings out of regular funds.

* One novel approach to corporate giving was the recent offer by a company to match (up to $1000) any employee's gift to his alma mater.

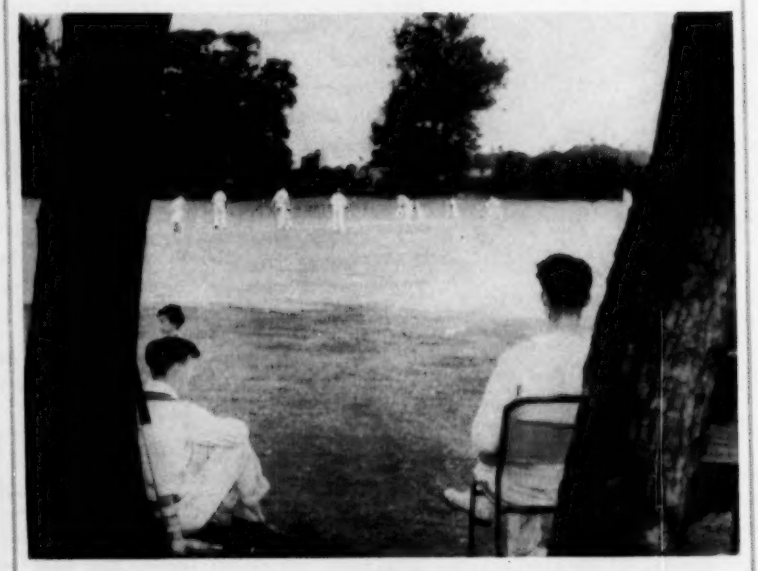


Respite at the Wicket

TO FUNCTION most effectively, researchers need a sizable measure of body building, in addition to cerebral stimulation. That's the philosophy of the cricket-playing lab men (*below*) who, during working hours, fathom petroleum problems at England's Anglo-Iranian Oil Co. Research Station (Sunbury-on-Thames, Berkshire). As an alternative to such nonathletic activities as operation of the low-temperature distillation gas analyzer (*top, left*) or the 500 gal./day pilot autofiner (*top, right*), they can liven both muscle and mood through sports, dances, and amateur dramatics at the nearby Meadhurst Sports Club.

No happenstance, these social facilities are part of the station's program for its 600 personnel, contribute a lot toward job contentment. Nearly 30 years old, the station has grown steadily both plant- and staffwise, now includes medical and welfare centers and a canteen on its 19-acre site.

Paints, building materials, insecticides, and other products needed by the firm in its worldwide operations are developed at this research center.



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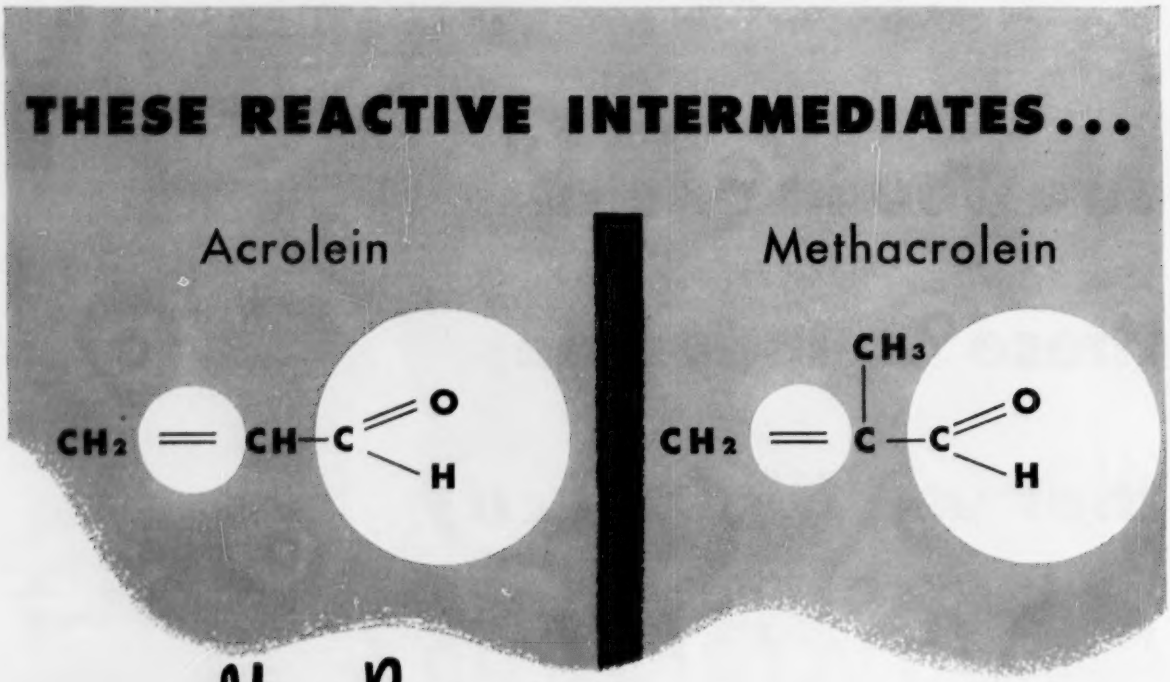

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Reactions already reported include: for acrolein, preparation of the amino acids methionine and lysine, 2-amino pyrimidine, folic acid, substituted quinolines, benzanthrone, odorants by Diels-Alder condensations with butadiene and substituted butadienes, and coating resins by reaction with urea, thiourea, and polyhydric compounds—for methacrolein, copolymers with high softening points and good solvent resistance, and resins for impregnating fabrics, linoleum, and adhesives.

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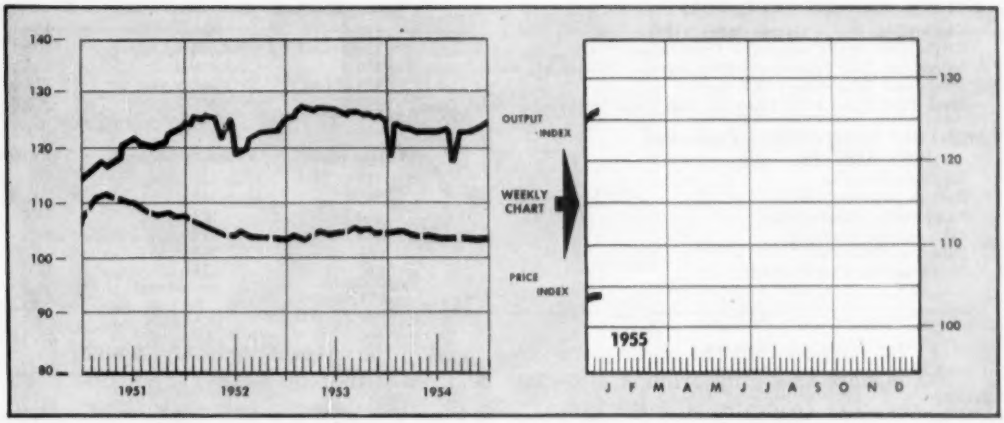


CW Index of Chemical Output—Basis: Total Man Hours Worked in Selected Chemical Industries
CW Price Index—Basis: Weekly Prices of Sixteen Selected Chemicals

MARKET LETTER

Trade talk that proved accurate is news that salt cake prices would edge higher. Combination of factors, which have pinched supply of nearby available material *(CW, Dec. 25, '54, p. 55)*, late last week impelled some producers to advance tags by $2/ton. New quote, in many areas, is now $28 (100% basis). Anhydrous sodium sulfate, too, is up by a similar amount, currently registering at $34/ton (c.l., bags, f.o.b. works).

Earlier, consumers of the technical-grade sulfate in 11 Western states, had been handed a $1.50/ton increase that pegged the levy at $17 (f.o.b. Trona).

But while some contract customers won't be faced with the higher sodium sulfate prices until Feb. 1, others have been paying more since New Year's Day.

•

On the other hand, copper sulfate quotations to most domestic users will likely remain firm—for the present, at least. This despite influences in the market that have some observers warily hedging on any general price prediction. One such deterrent: the split copper sulfate price now prevailing—a rare condition in the field.

Actually, only one seller has posted higher prices—$10.20/cwt. f.a.s. on material for export; $10.85 (c.l.) for domestic sales. (General price to U.S. users is $10.35/cwt.). Reason for the discrepancy: the higher-priced sulfate is being made from copper scrap, currently more expensive than today's 30¢/lb. copper metal. That in itself is an unusual situation; lends substance to one venturesome trader's comment: copper sulfate will go up—if the metal climbs above the present scrap price level.

•

There's no two-way price spread in store for 2° pyridine, however. It's a cinch that by this week all marketers will have emulated Pittsburgh Coke & Chemical's 20¢/lb. price slashing. The cut (which brings the refined down to a low 75¢/lb.), is a tri-pronged thrust at factors affecting the gloomy pyridine market. The aim:

- To buck foreign competition;
- To stimulate lagging interest of old-line consuming outlets;
- To encourage broader and newer uses.

It's a moot question whether or not the reduction will accomplish

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
CHEMICAL WEEK Output Index (1947=100)	126.4	126.3	124.1
CHEMICAL WEEK Wholesale Price Index (1947=100)	104.5	104.4	105.1
Bituminous Coal Production (daily average, 1000 tons)	1,486.0	1,699.0	1,358.0
Steel Ingot Production (1000 tons)	1,975.0 (est.)	1,960.0 (act.)	1,772.0
Stock Price Index of 13 Chemical Companies (Standard & Poor's Corp.)	373.9	376.9	266.8

MONTHLY INDICATORS—Production (Index 1947-49=100)	Latest Month	Preceding Month	Year Ago
All Manufacturing	132	132	132
Durable Manufactures	145	140	146
Nondurable Manufactures	120	123	118
All Chemical Products	148	147	145
Industrial Chemicals	163	158	150
Petroleum and Coal Products	130	128	131

its purpose, but the lower price is welcome in the dyestuff industry, which is now emerging from a long-time doldrum. Other major pyridine consumers (e.g., drugs, insecticides), though, aren't exactly barreling along, a condition that could nullify any desire to take advantage of the savings.

•

Speaking of insecticides, the dull domestic demand has understandably generated intense interest among DDT producers as to which companies will share in a 16.5-million-lb. export pie. General Services Administration expects to spend some $4-5 million for 75% wettable powder that will head for India, Iran, the Philippines, Pakistan and Indochina under Foreign Operations Administration aegis.

Although GSA is mum to all inquiries, inside word is that some purchases have already been negotiated. Topping the list so far is Mathieson's John Powell Division with two awards, one for 2.9 million lbs., another for 0.6 million. Other firms reportedly signed, and the amounts: Michigan Chemical, 0.8 million lbs.; Stauffer, 0.7; Geigy, 0.1; Diamond, 0.48.

That adds to 5.58 million lbs., but the balance of the order—the largest DDT purchase ever made by GSA—will probably be awarded this week or next. First block of material is slated for delivery by Jan. 15.

There's no official confirmation on prices, either; but bids tendered bore quotes ranging from 25.85¢ to 28¢/lb., with the average hovering at 26½¢. (Current domestic price on the 75% material is 29¢, but volume of the overseas business justifies the lower offers.)

•

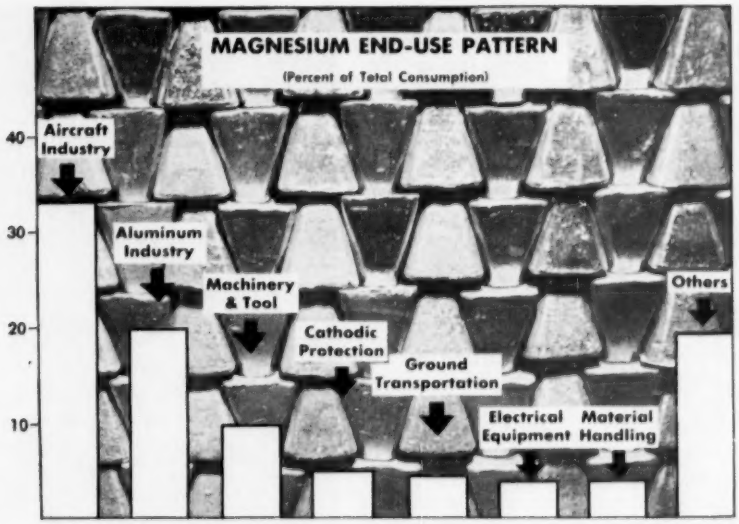
Toxaphene formulations may be in for a hike. Late last week Hercules Powder, prime toxaphene producer, weighed the current demand sluggishness against rising labor and material costs, decided the scales tipped too much toward the latter. Result: a full 1¢/lb. increase, bringing the c.l. (or truck load) price to 20¢ (f.o.b. works).

Formulators, now ready to buy with an eye to the upcoming insecticide season, haven't yet revealed what effect the toxaphene advance will have on their products, but the impact could be emphatic. Toxaphene emulsifiable liquids, for example, may be boosted some 6¢ or 8¢/gal.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending January 10, 1955

	Change	New Price		Change	New Price
UP					
Salt cake, dom., bulk, works, 100% Na_2SO_4 basis, ton	$2.00	$28.00	Sodium sulfate, anhyd, c.l., bags, f.o.b. works, ton	2.00	34.00
			Toxaphene, dms., c.l., or t.l., works	.01	.10
DOWN					
Pyridine, refd., 2°, nonreturn. drms. l.c.l., works, frt. equald.	$ .20	$ .75	Dioctyladipate, tanks, works	.01	.425

All prices per pound unless quantity is stated.



MAGNESIUM USE, hindered in some civilian outlets before, is now . . .

. . . Poised for a Jump

"We'll renew." Thus did Dow Chemical, the other week, end the three-month controversy centering on operation of the government-owned magnesium facilities at Velasco, Tex. (CW Newsletter, Jan. 1). The decision to pick up the option, extending its lease for three more years, until Jan. 31, 1958, assures continuing output from the plant—which is capable of producing some 88 million lbs./year of the lightweight metal—for both military and growing civilian requirements.

It's no secret, of course, that Dow would much rather have bought the magnesium plant; it lies right in the middle of its own Velasco operation. Prior to expiration back in October of the old contract with the General Services Administration, Dow reportedly offered the government $9 million in cash, plus a percentage deal on production which could have pushed the total kickback up close to $13.5 million. (The unit, incidentally, cost some $26.5 million to build during World War II.)

GSA, and, some reports have it, the Defense Dept., favored the sale. GSA's reasoning: such a transaction would have forestalled the expensive process of mothballing and maintaining the plant had Dow decided to relinquish its option.

A Dept. of Justice opinion, however, raised the specter of monopoly, dampened the sale prospect. A ruling that purchase of the magnesium plant by Dow (which had been running it for nearly five years) would tend "to maintain a situation inconsistent with antitrust laws," led the prime producer to withdraw its offer.

With the signing of the new lease, the government is not likely to take any further immediate action concerning magnesium production. Output from Velasco, and from Dow's own 60-million-lbs./year plant at Freeport, Tex., is more than enough to satisfy near-future demands.

Up from the Deep: Actually, magnesium's future is not dependent on the combination of market factors—supply, demand, production capacity—that affect most other chemical commodities.

Take supply, for instance. It's been estimated that the metal could be produced from the sea (raw material source for both Texas installations) at a fantastic rate of 100 million tons/year for a million years and reduce the magnesium content of seawater by only a fraction of a percent.

And the ocean is not the only practicable source that can be—and has been—used in a pinch. To meet critical stockpiling and other defense needs for magnesium at the start of the Korean War in '51, Washington reactivated six plants which had been mothballed since the end of World War II. Of the six, including Velasco, one, at Painesville, Ohio, used as a magnesium source salt brine produced at Ludington, Mich., while four others* made the metal from dolomite, a form of limestone.

With this availability, it's obvious that supply shortages will rarely, if ever, etch a furrow in producers' brows.

It's fairly clear, too, that productive capacity in the U.S. can easily be geared to needs, no matter how bloated—or how shrunken—they may become. A hop-skipping look at primary magnesium production down the years (*see box*), points up the ebb-and-flow control by requirements.

When, in 1953, the government decided to take five of its magnesium plants out of production, the cutback in available metal was impressive. Indeed, to some observers, the slashing appeared too drastic. In terms of rated capacity, output from the U.S.-owned facilities was reduced approximately 116.0 million lbs.

Largely because of the materials used, the Velasco plant was considered the most economical of the six operations. Output, under Dow management, augmented the magnesium rolling out of the company's Freeport plant.

But the primary metal produced at both plants was ample enough to cover national consumption. Decreased military requirements at the time, resulting from defense cutbacks, was in a measure counterbalanced by stepped up civilian applications.

The pattern – less military, more commercial use—was repeated in '54, but increase in the latter was not enough to offset the defense-take decline. Magnesium consumption by each, however, was just about equal, with total U.S. consumption last year averaging out to about 10% under the previous year's.

Outlook for '55, though, fairly sparkles from the producer's point of view. Industrial usage is expected to increase substantially, especially in castings and mill products. Chances are the upcoming 12 months will rack up a topper to '53, the previous peacetime high.

Dow's confidence in magnesium's future is underlined by its new high-

* Canaan, Conn.; Wingdale, N.Y.; Manteca, Calif.; Spokane Wash.

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speed, high-production rolling mill at Madison, Ill. The multimillion-dollar mill is tabbed the world's first installation for mass turnout of magnesium plate, sheet, and extrusions. The integrated operation will gulp primary magnesium ingot as raw material, spew out remelt alloy ingot for sale to other processors, as well as rolling and extrusion ingots and billets for processing in the plant.

Primary Magnesium Output
(in tons)

World War II Peak:	
1943	183,584
1944	157,100
Postwar Bottom:	
1946	5,317
Korean Period:	
1950	15,726
1952	105,821
1953	93,075
Today:	
1954 (est.)	73,000
1955 (est.)	95,000

Already in full operation are 5500-ton extrusion presses, and soon to be completed is installation of a 13,200-ton press. Plate and sheet production at Madison will notch a fourfold increase over Dow's previous rolling capacity at Midland, Mich. Published statistics on design capacity of the new mill: 36 million lbs./year of remelt alloy ingot; 16 million of plate and sheet; 14 million of extrusions.

This increase in mill product availability may well broaden civilian markets. Another Dow-inspired consumption spur: 10-25% price slashes in sheet and plate last year—a consequence of the Madison mill's expanding capabilities.

Today the transportation industry slices out the biggest magnesium-pie cut, (*see chart*), and aircraft (military and civilian) accounts for about a third of transportation's consumption. The No. 2 spot as a magnesium consumer is occupied—and will likely remain so for some time—by the aluminum industry. Perhaps 28-30 million lbs. will filter this year into aluminum for alloying purposes.

That magnesium is in for a dipless growth trek is highlighted by expectations in established uses as well as in some more recent applications held back by past dearth of civilian-available material.

Cathodic protection,* for instance, will consume a near-17% of all magnesium products (excluding ingot) within the next 5-10 years. At the moment, cast anodes are running at a 10-million/year rate and extruded at some 2½ million/year. And that adds up to only about 10% of the total amperage hours used in cathodic protection; it means magnesium still has a wide-open potential.

Development of land transportation outlets, particularly trailers and trucks, has been hobbled by the limited amount of magnesium products for commercial use since Korea. Now a new line of sheet and extrusions will be used for building van truck bodies; and the auto makers are expected to up their take of magnesium from the current 1½ to 2-million-lb./year rate.

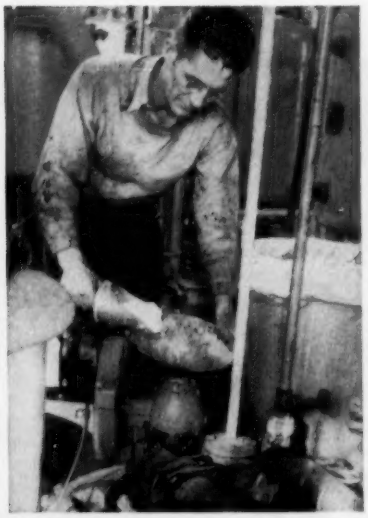
Industrially, too, magnesium use in titanium production is likely to increase. Reason: most of the present planned titanium plants call for magnesium as the titanium tetrachloride reducing agent.

Dow is also pinning hopes on many now-small magnesium consumers. The Dow etch process for photoengraving magnesium sheets and plates in '53 showed an 83% growth; this year the rate may be even greater. Portable tools, household appliances, business machines, textile machinery—these and a host of others, will happily boost consumption of the chemical metal. The prospects, too, clearly delineate Dow's motive for wanting to tuck Velasco, permanently, under its wing.

Gradual Incline

Glycine makers are gauging output for the year ahead. How? By a close look at antacid sales—an index of the chief market for this simplest of amino acids (aminoacetic acid). Dollar volume sales of stomach sweet-

* Used sacrificially, because of its inherent electrochemical properties, to protect from corrosion underground pipelines, hot water heaters, ship hulls, large industrial tanks, other steel structures.



GLYCINE CHARGE: One outlet, bug-killer allethrin.

eners*—a catch-all term including antacids—may have swept past the $41-million mark last year ('54 figures are still being tabulated)—up from $39.7 million the year before and $37.9 million in 1952.

Turnout of glycine now runs at about 100,000 lbs./year—some say as much as 150,000 lbs. Prime producers, Benzol Products and Dow Chemical, are mum on actual figures. Both firms make the precursor monochloracetic acid for the glycine.

Antacid Ante: Better than two-thirds of the glycine consumption in this country probably goes into antacids and other pharmaceutical preparations.. The principal form for this usage is dihydroxy aluminum glycinate (also called dihydroxy aluminum aminoacetate), used to neutralize gastric hydrochloric acid with "minimal side effects." The zwitter-ion effect of the amino and carboxylic groups of the glycine molecule produces a buffering effect not noted with aluminum hydroxide. The latter compound, however, far outsells the glycinates or aminoacetates in antacids. Reason: it's cheaper.

Use of the glycinate as a buffering agent is controlled by a patent held by Chattanooga Medicine Co. (Chattanooga, Tenn.). It, in turn, licenses some 10 other pharmaceutical companies to use this derivative in antacid preparations. Benzol Products and Dow Chemical each supply about 50% of the glycine for antacids.

At least two antacids contain glycine itself rather than the basic aluminum salt. These are Titralac (Schenley Laboratories) and Glycolixar (E. R. Squibb). Glycine serves as a buffering agent in conjunction with aspirin, too, as in Bufferin (Bristol-Myers Co.).

Among special applications of glycine is the production of a soluble form of theophylline, theophylline sodium glycinate, used as a diuretic.

The second largest market for glycine—the synthesis of allethrin—has not yet opened to originally anticipated demand. Glycine, sodium ethylacetoacetate, and acetylene are the major raw materials consumed in the manufacture of this insecticide—similar to pyrethrum flower extract. Best hunches are that somewhat more than 25,000 lbs. of glycine were consumed for this use in 1953, a sharp rise from the trickle of only 4300 lbs. of glycine in 1950. But last year, government stockpiles of allethrin were stabilized, and movements of it slowed. Over-all demand from civilian quarters did increase slightly, however.

From allethrin sprays to gastric interiors, glycine follows a varied path. It even gets into the earth's interior —via oil wells. In the acid activation of some oil wells, glycine may be added to buffer and prolong the activity of the muriatic acid.

Potential Protein: In retrospect, the sales outlook for glycine makers was bright immediately after World War II when a surge of glycine left these shores as a nutrient in the rehabilitation of war-ravaged populations in Europe. These sales to Europe were one-shot deliveries for the most part, dwindled away a few years later. Today, relatively small amounts of glycine are used in the U.S. as a nutrient in postoperative cases, or in treating patients with wasting diseases.

And this will bring no upswing in glycine demand. Allethrin uptake, *per se*, will not require much more glycine, but there's an outside chance that new markets for certain allethrin derivatives will be created by perfume manufacturers since purer allethrin intermediates are now available. The immediate outlook, though, is for a steady but slow growth of antacid sales to set the pace for glycine sales during the next 12 months.

*Category used for retail sales data collected by *Drug Topics*, including tablets, powders and liquids, except effervescent types.

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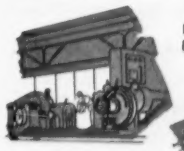
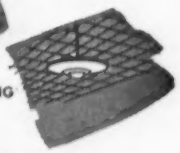


INTERIOR FACTORY WALL



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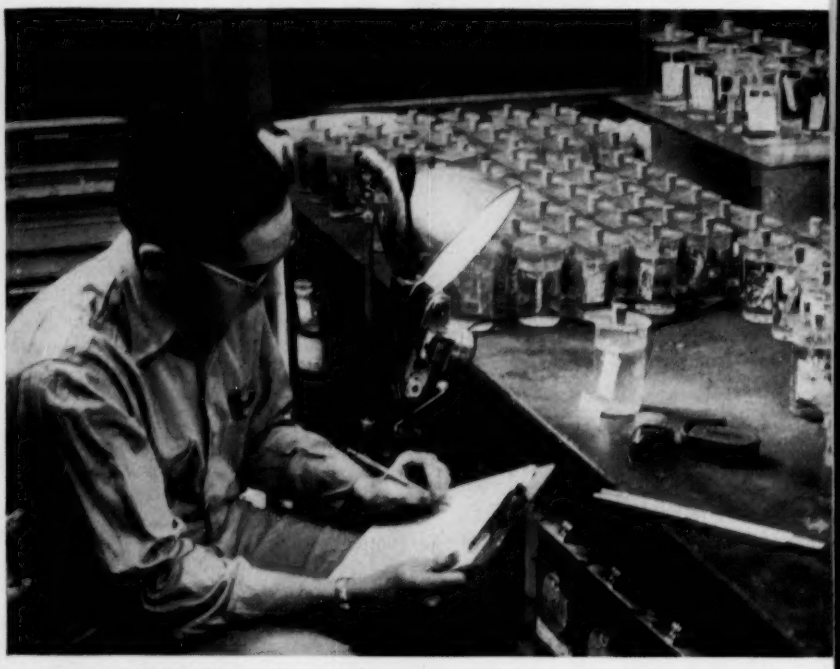


SERVICE BY TEST: Man and camera log protection that paint affords against corrosion . . .

Sales Bait: The Agent Lab

Just off Union Square, New York's favorite gathering place for radicals, one chemical sales representative operates an establishment that, if not downright revolutionary, may be deemed at least nonconformist. For while most agents leave lab service to their principals, the D. H. Litter Co. is not among their ranks; it's one of the few operating a full-scale lab to sell paint raw materials.

Strong as the sales lure direct service may be, most agents* consider it too costly for their thin margins and somewhat susceptible to liability suits (arising from formulations that don't work). But Litter (and others, too) finds the service worth every cent of the cost of corralling sales (currently $8-9 million/year).

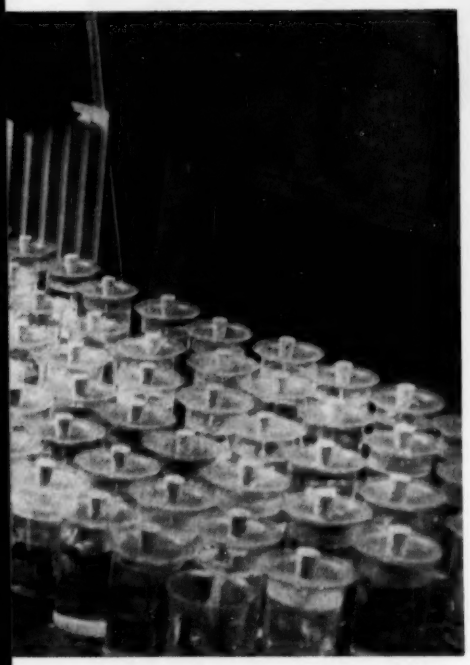
As cigar chain-smoker David Litter explains: many raw material makers stop short of the mark in servicing smaller producers. These makers, accounting for perhaps 50-60% of all paint production, have limited or no lab facilities.

They need "recipe" formulas, practicable in both quality and cost. And with so many new ingredients available now, even producers with formulators can test only a few. Large suppliers don't usually offer detailed advice (because of liability, small-volume account) and it's left to the producer to adapt "starting-point" formulas, figure cost short cuts.

What are the services that sell? At Litter, where a highly developed program has been in effect 20 years, they are:

- Technical advice. This is supplied by eight technical salesmen and the laboratory heads, varies from tips on production to use of materials, handling and storage.
- Formulation and testing. Actual laboratory work is involved here. A staff of six (besides paint consultant Daniels and lab director Levinson) devise formulations, perform evaluation tests on finished products
- The company also maintains a consulting service on a fee-basis, the Daniel-Litter Laboratory, which evaluates raw materials for paint products,

* Excepting dyestuffs, textile specialties, some rubber chemical representatives.



It's service, says sales agent Litter, 'and it pays.'

performs market research, and product development. Work is carried out for principals, customers and outsiders. Another lab carries out government contract work.

Service Scope: About 60 calls are par for the week. Of these, Litter estimates about 60% can be answered

FORMULAS: Ingredients make the film; service makes the sale.

KAY-FRIES...

$CNCH_2COOH$ cyanoacetic acid

Cyanoacetic Acid is an intermediate for amino acids, barbiturates, dyes, the purine group, vitamins and other drugs. Chemically, its "cyano-activated" methylene group and easily hydrolized cyano group are particularly interesting.

KAY-FRIES SPECIFICATIONS

assay ● 98.0% min. (by acidity and hydrolysis) Kay-Fries CYANO-ACETIC ACID is exceptionally uniform in purity with water accounting for substantially all of the remaining 2.0%.

color ● 75 Hazen scale (10 g. of acid in 50cc dist. H_2O).

ash ● .075% maximum.

Typical reactions of CYANOACETIC ACID

ESTERIFICATION
$CNCH_2COOH + ROH \longrightarrow CNCH_2COOR + H_2O$

AMIDATION
$CNCH_2COOH + HNRR^1 \longrightarrow CNCH_2CONRR^1 + H_2O$

CHLORINATION
$CNCH_2COOH + PCl_3 + Cl_2 \longrightarrow CNCH_2COCl + POCl_3 + HCl$

HYDROLYSIS
$CNCH_2COOH + H_2O \longrightarrow CH_2(COOH)_2 + NH_3$

REDUCTION
$CNCH_2COOH + 2H_2 \longrightarrow NH_2CH_2CH_2COOH$

CONDENSATION
$CNCH_2COOH + RCOR^1 \longrightarrow RR^1C{=}C(CN)COOH + H_2O$

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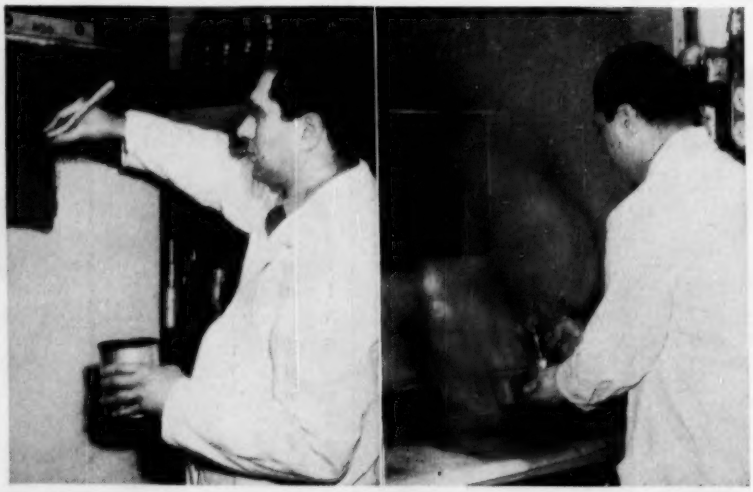

BRUSH OR SPRAY: Service either way, as covering, weathering tests are readied.

"pretty much off the cuff"; the remainder require 1 to 10 days work.

Understandably, Litter capitalizes to the maximum on his service. Salesmen actively hunt problems for the lab to solve, like to take a customer's formula and, by actual lab testing, show how Litter's materials may either reduce cost and/or improve quality. Coupled with the service, Litter views the whole approach as having these advantages:

- The service fills a need of the paint manufacturers, offers up-to-date, cost-competitive formulas.
- Communications are improved through the direct connection between agent and manufacturer. The paintmaker believes the agent is more interested in his problems and appreciative of their nature. Speed of handling, too, is increased.

Limits: Although Litter claims it's a rare problem he can't handle, the firm has its limits. It doesn't do basic research, rather confines itself to formulating and testing the finished coating. Fundamental research and new product development, as consultant Daniels puts it, are best left to the big companies and private research organizations.

Only a handful of paint raw material agents have their own labs. But those that do, such as Withington and Whittaker, Clark & Daniels, regard it as a sharp sales tool. Withington believes agent-service benefits the supplier as well; it cuts the principal's service costs and, importantly, provides an opportunity to pilot-plant (through customer contacts) formulations with new materials. WCD (also a manufacturer) reports its lab enables a check on the quality of products.

Dissent: On the other side of the representative-service fence are some agents and suppliers. John H. Calo, Inc. has dropped a service lab it once had. The reason: costs became too high. Calo relies on its principals and its own general knowledge of the field to handle service, has not observed any disadvantages arising from the switch.

One sales manager for a large raw material producer is opposed to agent service, considers it a risky undertaking. His reasoning:

- It duplicates the work of the supplier.
- It disseminates "recipe" formulation that could well lead to lawsuits, easily ruinous to a distributor with limited financial resources.
- Generally, in the light of margins and volume, the dealer can't afford high-quality service.

Countering this, however, Litter claims he has the hearty support of his principals; that his service supplements rather than duplicates advice offered by manufacturers; that any formulas given out are developed by himself; that he'll match lab and service quality against any manufacturer's; that he's had no lawsuits in 30 years.

Dealer service labs appear well established in textile specialties and to a lesser extent in dyestuffs. General Dyestuff and several New England agents report it fairly common among larger agents. And while a spokesman

for GD indicates that agents are moving away, somewhat, from "cook-book" servicing, he thought a trend was under way towards stronger dealer service involving improved textiles finishing applications and quality control of products handled.

Textile specialty service is a costly item. One New England agent estimated an agent would need a sales volume of at least $500,000/year to justify a lab with equipment tagged at $10,000.

Rubber chemical dealers, also, are indulging a bit in service, particularly when some products are manufactured. C. P. Hall Co. (Akron, O.), which considers itself 50% agent, 50% producer (organic esters, reclaiming oils, flexible rubber paint), runs a lab for rubber compounding and testing. Exclusively for customer service, the lab sometimes takes as much as $100,000/year to operate. Charges are not passed on but the profit margin and potential volume determine scope of servicing.

Advantages Hall sees: work is performed on individual problems (rather than on broad applications), which large producers do themselves; products become more salable; and better drawing power from its principals, who heartily endorse the practice, results.

Bulk chemical and solvent representatives aren't generally in the service picture. Several whom *CW* contacted indicated that their products were so well known that service wasn't often needed, that principals advised rapidly when problems did arise, and that margins would prohibit it anyway.

Whither agent servicing? Right now, it's unlikely that many will add labs; it's just too expensive. Litter figures he has at least $30,000 in equipment, a solid $5000 monthly overhead.

One thing is sure, though: nonconformist Litter is sold on the value of agent service. Planning a plunge into plastics compounding materials, he intends to add both a lab and a staff. And as far as *CW* can learn, only one other agent (Whittaker, Clark & Daniels) claims to be doing it.

•

For Your Reference:

• Trade lists of foreign business firms—recently published: Ceramic Manufacturers (Norway); Chemical Importers and Dealers (Spain); Medicinal and Toilet Preparations Importers and Dealers (Brazil, Peru); Metal Working Plants and Shops (Norway); Oil (Animal, Fish and Vegetable) Importers, Dealers, Producers, Refiners and Exporters (Sweden); Paint, Varnish and Pigment Importers, Dealers and Manufacturers (Australia); Pulp and Paper Mills (New Zealand); Tanneries (Uruguay); Textile Industry (Italy). U. S. Dept. of Commerce, Washington 25, D.C.

• Ceramic, Paper, Textile, Wood and Other Products: Government-Owned Inventions Available for License—gives title, patent number, and an abstract of 308 federally owned inventions available for licensing. Office of Technical Services, U. S. Dept. of Commerce, Washington, D.C.

• Pulp and Paper Industry in Europe—a report outlining opportunities and prospects for the industry in Europe. Contents include: production, trade, future prospects, colonial developments, and conclusions. O.E.E.C. Mission, Publications Office, Washington 6, D.C.

• Freight Loss Pamphlets—a series of 24 pamphlets on damage prevention. Catalog available on request. Assn. of American Railroads, Freight Loss and Damage Prevention Section, Chicago.

• Pallets and Palletization—Handbook describing planning, construction, and usage of palletization. Included are departments on specifications, choice of pallets, and maintenance. National Wooden Pallet Manufacturers Assn., Washington 6, D.C.

• "The Technology of Solvents and Plasticizers"—reference book discussing technical, practical and theoretical considerations of plasticizer and solvent use in adhesives, inks, surface coatings, plastics, and synthetic fibres. John Wiley, Inc., New York City.

• Firestone Plastics Co., Chemical Sales Division (Pottstown, Pa.) has issued two technical bulletins, Exon 470 and Butaprene Paint Latices. Exon 470 describes technical data for the firm's vinyl chloride copolymer resin. Butaprene Paint Latices provides information on the use of butaprene for styrene-butadiene latex paints.

• "Glycerine Alkyds Tailored To Need" — 20-p. booklet containing articles on choosing resins and raw materials. Processing data also included. Glycerine Producers' Assn., New York City.

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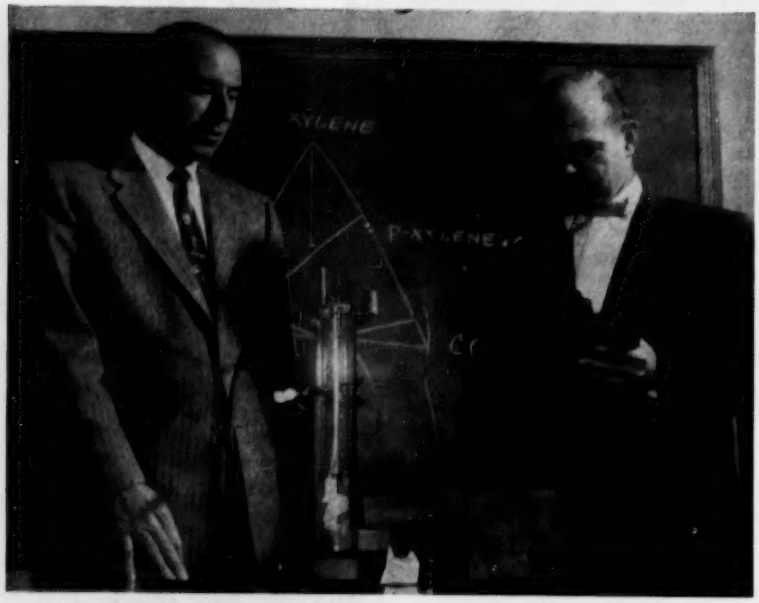


CAL RESEARCHERS Egan (left), Luthy. Their process gets xylenes . . .

Ready to Move Up

Although the xylenes rode into the chemical big time on the coattails of para-derived synthetic fibers,* they are not counting on that market alone to keep them there. Instead, producers are striving to insure the future of xylene as a chemical building block through the development of more outlets for the little-used meta isomer, improved processes of efficient recovery of para-xylene. A good bet to fill the latter bill: a new selective solid formation process developed by California Research Corp. (Richmond, Calif.).

Commercial fractionation of the xylenes was launched in 1945 when two new uses for pure isomers created a demand: Oronite Chemical turned to abundant petroleum-derived stocks for its phthalic anhydride by oxidation of ortho-xylene, Imperial Chemical Industries sought para-xylene for the terephthalic acid used in its synthetic fiber Terylene. Subsequent development of Du Pont's Dacron fiber and Mylar film boosted the para market to an unprecedented high, lured several producers into the field.

But while para-xylene capacity jumped from 2 million lbs./year in 1950 to an estimated 65 million in 1953, there was little improvement in the recovery process. Though still in use today, fractional crystallization of meta-para mixtures is quite inefficient, recovers less than one-third of the para in typical catalytic reformer cuts. Further separation is prevented by the formation of a binary eutectic of meta- and para-xylene. This leaves large quantities of mixed meta and para to be disposed of; and since motor fuels and solvents are the only takers, most of the cost of separation must be borne by the pure para.

Alternate Routes: Cal Research, a subsidiary of Standard Oil of California, has been interested in the xylenes from the start, has developed several separation processes. Among those on which it holds basic patents:

- Low-temperature fractional crystallization of para-xylene.
- Fractional crystallization in the presence of carbon tetrachloride for either ortho- or para-xylene.
- Selective xylene sulfonation and hydrolysis of resulting sulfonic acids.
- Selective solvent separation with $HF\text{-}BF_3$.

But it is the separation in the presence of carbon tetrachloride that seems to be the most promising. Researchers Clark Egan and Raymond Luthy found that it permitted the recovery of up to 90% of the para isomer in typical catalytic reformer xylene feedstocks.

Key to the success of this process: the selective reaction of carbon tetrachloride with para-xylene to form an equimolal, solid molecular compound. Separation of this compound is limited only by the formation of its ternary eutectic with meta-xylene and carbon tetrachloride, but at a much lower para content than the meta-para eutectic.

For example, with a typical reformer cut (18% para-, 82% meta-xylene), the mother liquor remaining after conventional fractionation contains 13% para-xylene. But if the same cut were separated with carbon tetrachloride, the mother liquor would contain only 2% para-xylene.

More Meta: Though the primary goal of Egan and Luthy's research was improved para yield, they found that the carbon tetrachloride process also permitted high recovery of pure meta-xylene. Up to 92% of the meta isomer can be recovered by freezing the carbon tetrachloride-free mother liquor. Whether or not this fraction will assume commercial significance remains to be seen. At any rate, the new process reduces the quantity of mixed xylenes that have to be disposed of.

The optimum amount of carbon tetrachloride required for the desired separation is one mole per mole of para-xylene, plus 1.2 moles per mole of meta. The latter requirement, which serves to prevent meta crystallization, may be reduced somewhat by the 20-30% of other aromatics and nonaromatics contained in typical stocks.

Other tetrahalogenated methanes can be used to form solid compounds with para-xylene, but most of them are more costly, less selective than carbon tetrachloride. Too, carbon tet has the advantage of being readily available, easily separated from the xylenes by simple distillation.

Market Question Mark: Acceptance of the carbon tetrachloride fractionation process is largely dependent

* Du Pont's Dacron, ICI and CIL's Terylene.

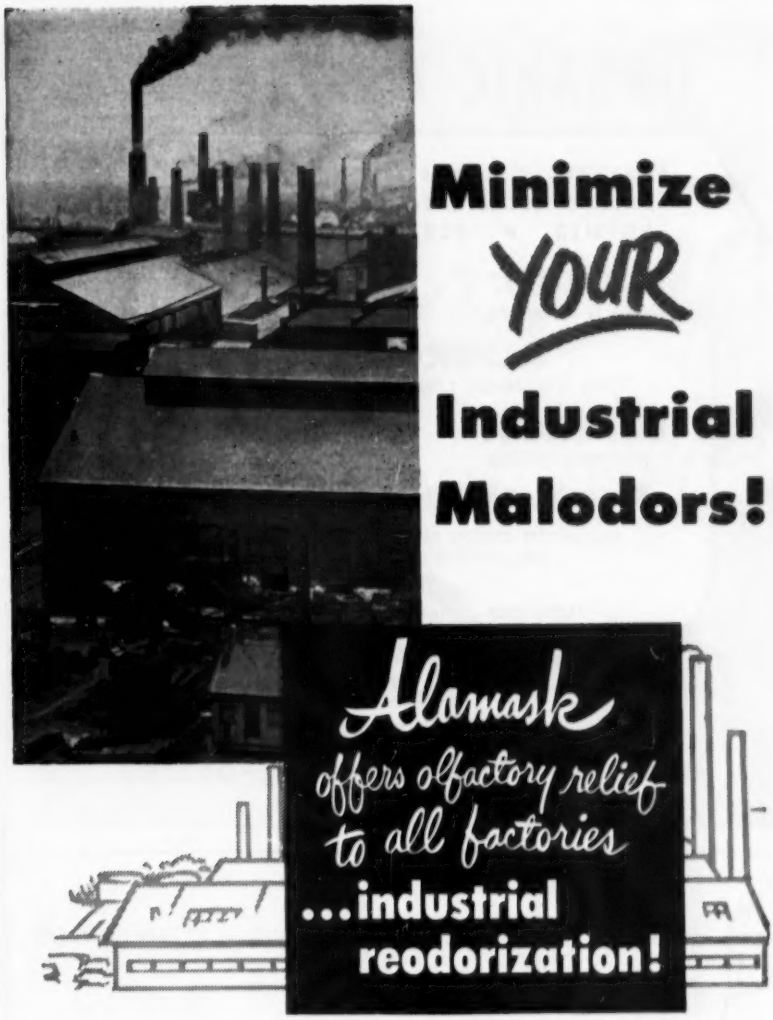
upon the rather uncertain future of para-xylene. It entails a greater investment for carbon tet distillation equipment and lower temperature operation than straight crystallization. The competitive balance seems to rest ultimately on the balance between the amount of available feedstocks, plant capacity and demand. If the first two suffice to satisfy the latter, the higher yields obtained by the carbon tet process would not justify the added expense.

And at its present level, para demand is taxing neither feedstocks nor plant capacities. In fact, existing para plants, built in anticipation of soaring para needs, have more than adequate capacity to supply current consumers. Some prospective producers shelved plans for para plants when the demand fell short of early optimistic predictions. Standard Oil of Indiana, for one, has adopted a wait-and-see attitude, put its proposed 14-million-lbs./year para project at Whiting, Ind., on deferred status.

But others are going ahead with plants as planned. Hercules Powder is turning out 200,000 lbs./month of dimethyl terephthalate (DMT) from para-xylene, expects to bring in its new 12-million-lbs./year plant (*CW, Jan. 30, '54, p. 64*) in May. Hercules is also continuing its investigation of dimethyl isophthalate from meta- and mixed xylenes on a 10,000-lb./month pilot-plant basis. But the only large-scale plan for pure meta conversion is Oronite's abuilding $10-million DMI plant in California.

No Sudden Change: Though no xylene producers or consumers foresee any sudden surge in meta or para demand, the general feeling seems to be that it will continue to increase, but at a less spectacular rate than its meteoric rise during the past few years. Du Pont expects that improvement of the textile market will boost its 1955 para consumption for Dacron above the 1954 level. And its Circleville, O., Mylar plant, in operation since Oct. '54, will probably take up four to five times more para than it used last year.

But regardless of what the future holds for the xylenes, the technology required to maintain its economic balance is ready and waiting should the need arise.



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PRODUCTION . . . . . .

EVENDALE EDT: In Ohio, GE's Coch

Completing

In Evendale, O., last fortnight, General Electric's Dale Cochran sat at the keyboard of International Business Machine's new Electronic Data Transceiver (*see cut, top*). From New York came the go-ahead signal and Cochran switched on.

A split second later at IBM's Technical Computing Bureau (*see cut, bottom*) in New York, the first punched-card facsimile began to materialize; others followed at the rate of 11/minute exactly duplicating those being fed in at the Evendale end. GE had thus completed its data transmission circuit, solved a problem in long-range problem solving, and added an IBM 701 electronic brain to its payroll.

Four-Way Hookup: The 701—rented from IBM for a full eight-hour daily shift—will supplement GE's own 701, enable the company to handle additional data until it gets its other "brains" sometime this year. Together with the Transceiver, it augments a telegraphic network that the company had already set up among three of its plants for rapid, long-range processing of engineering and research problems. It works like this:

As before, engineers at GE plants

ad a number of engineering problems.*

the Circuit

in Lynn, Mass., and Schenectady, N.Y., will teletype problem data to the computing center at GE's Evendale plant, where the data will be

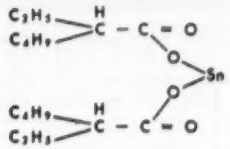
*To Cochran's left is IBM's W. Westfall; on the right, GE's H. Grosch. Below, gathered around Betty Horn at the receiver are (l. to r.) GE's Glenn Warren and Allen Keller.

IBM BUREAU: In New York, they found the solutions.

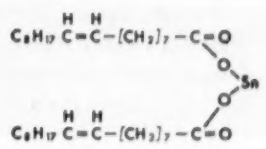
From the M&T Research Laboratory

A New Group of Stannous Soaps

Now available in pilot plant and research quantities is an interesting group of new tin chemicals comprising a wide variety of solvent-free stannous soaps.



STANNOUS OCTOATE



STANNOUS OLEATE

Examples of these new tin soaps are Stannous Octoate and Stannous Oleate, which have the following properties:

CHEMICAL NAME	FORMULA	DESCRIPTION	SUGGESTED USES
Stannous Octoate	$Sn(C_8H_{15}O_2)_2$	A clear, light yellow, somewhat viscous fluid. Contains approximately 28% tin.	Used as a polymerization catalyst for curing silicone oil emulsions.
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The Transceiver circuit, it is believed, will increase both speed and reliability of transmission. And to improve the rest of its network, GE plans to install Transceivers in the near future at both Schenectady and Lynn.

By Two's

Not all the problems were licked or in some instances even dented, but for the most part, production men came a long way last year in their buildup of the titanium industry. In a year-end review of the industry, Tom Lippert, sales and technical service manager, Titanium Metals Corp., (New York) chalks in the 1954 box score, notes in particular that last year's production of the metal more than doubled 1953's output.

For the past five years, in fact, titanium sponge production has at least doubled itself each year right up to 1954's government-estimated 5250 tons. For 1955, Lippert foresees the possibility of a repeat performance (to 10,500 tons) with smaller advances paced off in 1956 (a possible 15,200 tons) and 1957 (about 22,500 tons).

But even more impressive, he believes, are the improvements in quality, reductions in processing losses.

Perhaps the most significant news technologically in 1954 was the appearance of a modified reduction process employing sodium in place of magnesium (Kroll process) to reduce the tetrachloride to titanium metal (*CW, July 3, '54, p. 49*). While the process isn't new, its specified use by Union Carbide and Carbon and Imperial Chemical Industries is.

Lion's Share: Principally responsible for last year's titanium surge were Titanium Metals and Du Pont, which accounted for about 2500 tons of sponge apiece. The Bureau of Mines added 150 tons while the 100-ton sponge balance came from other pilot operations.

This year, Cramet, Inc. (Chattanooga, Tenn.) is expected to come onstream with its 6000-ton/year opera-

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- Horizons Titanium Corp. has a pilot unit abuilding at Stamford, Conn.
- Kennecott Copper Corp. (New York) has expressed interest in setting up a 3-tons/day semicommercial unit.
- Imperial Chemical Industries, with a 1500-ton/year plant abuilding in England, intends to build a plant in the U.S.

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